

**Department of Developmental Services**

**Purchase of Services Study II:**

**Report #1:**

**Modeling the Variation in Per Capita  
Purchase of Services Across Regional Centers**

**A Report to the Legislature  
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**Keith F. Widaman, Ph.D. and Jan Blacher, Ph.D.  
UC Davis UC Riverside**

**“Determination of Service Variation Across Regional Centers:  
Implications for Clients and Policy”**

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## **PREFACE**

**This report contains results derived from statistical modeling of the variation in per capita purchase of services for persons with mental retardation and developmental disabilities served by the 21 regional centers across California. Variation in per capita purchase of services was modeled as a function of several system-related factors that should influence purchase of services (such as consumer age and place of residence) and several factors that, if the basis for substantial differential service expenditures, would represent biases in purchase of services (such as consumer ethnicity). Regional center catchment areas are complex, and each regional center serves a unique blend of consumers with differing needs and characteristics. Therefore, to determine the variation due to various factors, one must carefully parcel out this variance based on knowledge of the process of service delivery, attempting to ascertain whether any biases in service delivery are present.**

**The Department of Developmental Services and the California Health and Human Services Agency recommended that a thorough examination of purchase of service data be undertaken, pursuant to the original Purchase of Services study report issued in April 1999. The present study was undertaken to fulfill this recommendation and was conducted in conjunction with the Association of Regional Center Agencies and stakeholder groups.**

**This is the first of three reports to be completed under the project titled Purchase of Services Study 2. The second report will discuss findings from a state-wide survey of service coordinators and parents/guardians and a series of focus groups conducted at sites around the State of California with parents/guardians of persons receiving services through regional centers and with personnel from the regional centers. The third and final report will weave the findings from the first two reports into an overall summary. This report contains findings and recommendations based on statistical modeling of purchase of service data, but final recommendations must be informed by findings from the other forms of data collection undertaken on this project.**

# **PURCHASE OF SERVICES – STUDY II REPORT #1**

## **EXECUTIVE SUMMARY**

This report presents analyses of Purchase of Service (POS) data for persons with developmental disabilities who were served by the 21 California regional centers within the years 1995-1996 and 1999-2000. Regional center personnel monitor and arrange for services provided to persons with developmental disabilities, in collaboration with the California State Department of Developmental Services (DDS), which has oversight responsibility. This system is a very large one, serving over 160,000 persons with developmental disabilities and providing services that totaled over \$1 billion during each of the five years examined; current yearly expenditures are as high as \$2.5 billion.

In any service delivery system that is as large and multifaceted as that administered by DDS and the regional center system, concerns naturally arise regarding the equity with which consumers are served. In the 1998 Budget Act, Item 4300-001-0001, Provision 4, stated that the California State Department of Developmental Disabilities (DDS) should conduct an analysis of the purchase of services (POS) through the 21 regional centers. The purpose of that study was to identify the factors that contribute to variation in the POS for persons with developmental disabilities. The resulting report, dated April 1999 (POS I), appeared to show large differences in per capita expenditures depending upon the regional center providing service and the ethnicity of the client. Of special concern were the findings concerning ethnic group differences in expenditures, particularly the finding that per capita expenditures for White clients was higher than those for Hispanic clients, in a ratio of almost 2:1.

Thus, the Department of Developmental Services and the California Health and Human Services Agency recommended that a more thorough examination of purchase of service data be undertaken, pursuant to the April 1999 Purchase of Services report, or POS I. The present study was undertaken to fulfill this recommendation and was conducted in conjunction with the Association of Regional Center Agencies and stakeholder groups. The current study was a further investigation of these variations in purchase of services. Specifically, the body of this report contains more in-depth analyses than those reported in the POS I report, including an examination of expenditure data across five years using a variety of statistical methods and controlling for the influences of other relevant, possibly biasing variables. This current Report #1 of the POS II study is based solely on these expenditures available on the DDS database.

In addition, we have undertaken a large-scale survey of parents (and in some cases consumers or guardians) in order to assess both their perceived need for services and supports, and the actual received services. The corresponding service coordinator for each consumer also completed a complementary survey, to help determine both the validity of the parent/guardian/consumer response and the correlation between the perceived needs. Finally, a series of focus groups, involving parents/guardians, consumers and service coordinators, were held across the

State at selected high expenditure and low expenditure regional centers. Findings from these other two data sources, along with other data available from a small subsample of Hispanic families in Southern California, will comprise Report #2 of the POS II study. We anticipate that these survey and qualitative data will be used to further elucidate the process of expenditures across the 21 regional centers, and will help us to interpret the large-scale analyses presented in the body of this report. The third and final report will weave the findings from the first two reports into an overall summary.

The present report contains results derived from statistical modeling of the variation in per capita purchase of services for persons with mental retardation and developmental disabilities served by the 21 regional centers across California. Whereas the POS I report examined data across only two years, this current report examined variations in service expenditures across five fiscal years, from 1995-1996 to 1999-2000. Variation in per capita purchase of services was modeled as a function of several system-related factors that should influence purchase of services (for example, consumer age and place of residence) as well as several factors that, if the basis for substantial differential service expenditures, could represent biases in purchase of services (for example, consumer gender or ethnicity). Furthermore, for the first year (1995-1996), we compared four different statistical approaches, with an explanation for each (raw cost value analyses; log transformed cost values; trimmed cost values; “Winsorized” cost values) in order to determine which would yield the most parsimonious and interpretable findings. Subsequent years are all presented, in the body of the report, using trimmed cost values, although available Appendices include results from analyses of all forms of the data.

When analyzing expenditures, we estimated the effects of five legitimate cost-related factors and three potential bias factors. We have analyzed for differences on each of these factors in two ways: (1) without reference to the other factors, as in POS I, and (2) controlling for the effects of the other factors. The second approach to analysis allows us to see how much independent influence the factor has, above and beyond the influence of the other factors; it provides a clearer understanding of the importance of each factor. Regional center catchment areas are complex, and each regional center serves a unique blend of consumers with differing needs and characteristics. Therefore, to determine the variation due to multiple factors, one must carefully parcel out this variance based on knowledge of the process of service delivery when attempting to ascertain whether any biases in service delivery are present. The eight factors examined are summarized below, with some explanation of the major findings for each legitimate cost-related and potential bias factor. As the body of the this report indicates, we examined the fiscal year 1995-1996 in the most detail; subsequent years revealed similar findings, but using only one of the four statistical techniques examined using the 1995-1996 data. However, we expanded on the most recent year, 1999-2000, in the body of this report.

All cost estimates indicated in this Executive Summary are based on the 1999-2000 fiscal year. The following sections summarize the influences of the legitimate cost-related and potential bias factors and provide a summary of our findings to date.

## FIVE LEGITIMATE COST-RELATED FACTORS

### **Legitimate Cost Factor #1: Consumer Chronological Age**

- **Consumer Chronological Age was categorized for these analyses**
  - Age Categories used were: 0-2 years (or infants), 3-11 years (or children), 12-22 years (or adolescents), 23-44 years (or young adults), and 45+ years (or older adults).
- **Age was strongly related to Total Purchase of Service (POS) costs**
  - Infants (0-2 years) identified as needing services often have severe or profound mental retardation and are medically fragile, thus requiring extensive services. The average cost is about \$11,000 per year. However, infants comprise only about 1 % of the population served by regional center.
  - Children (3-11 years) and adolescents (12-22 years) receive most of their services through agencies tied to schools, and thus require much lower levels of services through the DDS system. The average cost is about \$6,200. Children account for about 50% of regional center clients.
  - Young adults (23-44 years) and older adults (45+ years) have “aged out” of the school system and therefore require services through the DDS system that were previously funded through school-related sources. The average cost is about \$10,500 per year. These remaining adult groups comprise about 50% of the client population. We should be mindful that some young adults are served in other public settings, whose funding wouldn’t be included in the expenditures in this database.
- **Age had major influence, specifically, on Day Program costs**
  - Day Program services received by young and older adults (approximately \$4,600 per year) were much more costly than day program services for children and adolescents (approximately \$1,000 per year).
- **Age also had smaller, but systematic influences on other categories**
  - Adults used far more Transportation services (\$400 per year) than did infants, children, or adolescents (less than \$100 per year).
  - Parents/guardians of adults used rather less In Home Respite service (\$ 55 per year) than did parents/guardians of children or adolescents (\$ 220 per year).
  - Adults required more use of Support Services (\$550 per year) than did infants, children, or adolescents (\$300 per year).

- **Estimated effects of Age held whether other independent variables were controlled or not, attesting to the validity of the patterns associated with consumer chronological age**

## **Legitimate Cost Factor #2: Consumer Place of Residence**

- **Residence types were categorized for analyses**
  - The following Residence types were used: Community Care Facility (or CCF), Intermediate Care Facility (or ICF), Skilled Nursing Facility (or SNF), Home of Parent or Guardian, Independent Living, and Other.
- **Residence type was strongly related to Total POS costs**
  - Consumers living in CCFs had rather high levels of POS costs. The average cost was about \$22,000 per year.
  - Consumers living in ICFs, Independent Living, or Other settings had medium levels of POS costs. The average cost was about \$8,000 per year.
  - Consumers living in SNFs or the home of a parent or guardian had the lowest levels of POS costs. The average cost was about \$4,000 per year. However, residence costs associated with most ICF or SNF facilities may be paid for by other services (e.g., Medi-Cal) and hence would not be picked up in this expenditure database.
- **Residence type had strong effects on certain cost categories**
  - Consumers living in CCFs had much larger Out of Home expenses (about \$15,000 per year) than did consumers living in other types of residences (about \$1,000 per year).
  - Consumers living in CCFs or ICFs had much larger levels of Day Program costs (about \$5,000 per year) than consumers residing in other forms of housing (about \$1,800 per year).
- **Residence type had smaller, but systematic effects on other cost categories**
  - Consumers in CCFs or ICFs had larger Transportation costs (about \$400 per year) than residents in other settings (about \$120 per year).
  - Consumers residing in the home of a parent or guardian had larger amounts of In Home Respite service (about \$600 per year) than did residents in other settings (about \$50 per year).
  - Consumers residing in Independent Living or in Other settings had higher levels of Other expenses (about \$550 per year) and Support Service expenses (about \$900 per

year) than did consumers living in the remaining settings, who had lower levels of Other expenses (about \$275 per year) and Support Services (about \$175 per year).

- **Effects of residence type held whether other independent variables were controlled or not, attesting to the importance of the patterns of costs associated with residence type**

### **Legitimate Cost Factor #3: Client Characteristic**

- **Client Characteristic refers to the primary programming under which a consumer is served**
  - Client characteristic categories included: Autism, Behavior Adjustment, Child Development, Habilitation, Medical, Physical Development, Physical-Social Development.
- **Client Characteristic was strongly related to overall POS service costs, but only when other independent variables were not controlled**
- **When other independent variables were controlled, Client Characteristic had relatively small effects on costs**
- **Client Characteristic appears to have an effect on a single cost category**
  - Consumers in Behavior Adjustment programs had higher levels of Out of Home expenses (about \$4,300 per year) than did consumers in the other programs (about \$3,200 per year).

### **Legitimate Cost Factor #4: Consumer Level of Mental Retardation**

- **Level of mental retardation was categorized for analyses**
  - The following levels of mental retardation were used: No retardation, mild retardation, moderate retardation, severe retardation, profound retardation, and unspecified retardation.
- **Level of mental retardation was strongly related to Total POS costs, but only when other independent variables were not controlled. When other independent variables were controlled, level of mental retardation had relative minor influences on POS costs**
- **Level of mental retardation had a modest effect on Total POS costs**
  - Consumers with severe or profound mental retardation had somewhat higher costs (about \$9,700 per year) than did consumers at other levels of mental retardation (about \$8,400 per year).

- **Level of mental retardation had effects on certain cost categories**
  - Consumers with severe or profound mental retardation had higher Out of Home (\$3,500 per year) and Day Program (\$3,700) than did consumers at other levels of mental retardation, who had lower Out of Home (approximately \$3,000 per year) and Day Program costs (about \$2,500 per year).

### **Legitimate Cost Factor #5: Consumer Levels of Adaptive and Maladaptive Behavior**

- **Adaptive and Maladaptive Behaviors were assessed on six dimensions**
  - The six dimensions of adaptive and maladaptive behavior were: Motor Competence, Independent Living Skills, Cognitive Competence, Social Competence, Personal Maladaptation, and Social Maladaptation
- **Consumer levels of adaptive and maladaptive behavior had modest effects on POS service costs**
- **Consumer levels of adaptive and maladaptive behavior had clear effects on a single cost category**
  - Consumer levels of adaptive and maladaptive behavior had an effect only on In Home Respite services. Parents or guardians of consumers with higher levels of maladaptive behavior used more In Home Respite services than did parents or guardians of consumers with lower levels of maladaptive behaviors.

## **THREE POTENTIAL BIAS FACTORS**

### **Potential Bias Factor #1: Consumer Regional Center**

- **Total POS costs varied modestly as a function of regional center**
  - Consumers in the three highest spending regional centers received over \$8,700 per year in services (range \$8,729 to \$9,393), whereas consumers in the three lowest spending regional centers received under \$6,000 in services (range \$4,969 to \$5,960).
- **Regional center differences in service costs were reduced slightly, but still substantial when other independent variables were controlled**
  - The gap between the highest and lowest spending regional center was reduced from \$4,400 to \$2,900.

- **Regional center differences were found in certain cost categories**
  - Regional center differences were most apparent in the Out of Home, Day Program, and Transportation cost categories, with differences in other cost categories rather minor.
- **Sources of differences in regional center costs are likely due to factors that were not available for analysis in this report. Regional center differences will be explored further in subsequent analyses of survey and focus group data**

### **Potential Bias Factor #2: Consumer Gender**

- **Consumer gender was essentially unrelated to Total POS costs**
- **Consumer gender was unrelated to specific cost categories**
- **Effects of consumer gender on POS costs were the same, regardless of whether or not other independent variables were controlled**

### **Potential Bias Factor #3: Consumer Ethnicity**

- **Consumer ethnicity was categorized for analyses**
  - The following ethnic categories were used: Asian, Black, Filipino, Hispanic, Native American, Polynesian, White, Other, and Unknown.
- **Consumer ethnicity was strongly related to Total POS costs, but only when other independent variables were not controlled**
- **Consumer ethnicity was only weakly related to Total POS costs when other independent variables were controlled**
  - White consumers received somewhat higher levels of service (approximately \$ 9,475 per year) than did persons in the other ethnic categories (about \$ 9,100 per year).
- **Consumer ethnicity was essentially unrelated to expenditures under the specific cost categories**
- **Effects of consumer ethnicity found in the initial Purchase of Services (POS I) study are largely spurious**
  - Spurious effects are those that appear after failing to control for important causal effects.

- When legitimate contributors to cost (e.g., age, residence type) were controlled, differences among ethnic groups in expenditures were small. Nevertheless, some significant differences did remain. The other two foci of this study (surveys and focus groups) were designed to examine client service desires and satisfaction, and should aid in interpreting the present findings.

## DIFFERENCES ACROSS COST CATEGORIES

- **Clear differences arose across categories of service with regard to ability to explain variations in costs**
- **The categories of (a) Out of Home expenses, (b) Day Program costs, (c) Transportation, (d) In-Home Respite, and (e) the Total POS were moderately well modeled by the set of predictors**
  - Explained variance for each of the above categories of costs ranged between 20 and 64 percent of the variance.
  - The categories of (a) Out of Home and (b) Day Program costs contribute most to Total POS costs, so the high levels of explained variance for these categories is probably due to the large variance in costs on these variables.
- **The remaining categories of service costs of (f) Medical Care, (g) Out-of-Home Respite, (h) Other non-medical, and (i) Support Services were not well captured by the predictors available**
  - Explained variance for each of these categories of costs tended to be less than 7 percent of the variance.
  - Low levels of explained variance suggests that non-systematic factors associated with individual consumers may influence these costs.
  - Low levels of explained variance may also be due to the low levels of variability across consumers in these expenses.
  - Because the categories (f) through (i) listed above contribute little to the Total POS costs, the failure to explain their variance well is of little concern.
- **OVERALL: For certain categories of expenditure, consumer age was the primary factor influencing expenditures; for other categories, consumer residence was the primary factor; remaining independent variables explained much less variance than did these two characteristics.**

## INTERIM CONCLUSIONS

This report demonstrated clear and interpretable patterns of service expenditures for clients served through the 21 regional centers in the State of California. Importantly, the patterns of service expenditures were very similar across the five fiscal years examined, suggesting that the regional centers maintain consistent standards for service delivery.

This study documented clearly the influences of legitimate cost factors: client chronological age, residence type, consumer characteristic, level of mental retardation, and levels of adaptive and maladaptive behavior. These consumer-related characteristics should drive services - and they do. In particular, consumer age and residence type have large, consistent, and expected effects on the major cost categories. The variables of consumer characteristic, level of mental retardation, and levels of adaptive and maladaptive behavior had smaller, but still quite consistent and expected effects on service costs.

The potentially biasing factor of consumer gender had no relationship to service costs, and the factor of client ethnicity had a rather small influence on service costs, although some differences remain even when other factors are controlled for. The follow-up studies, utilizing consumer surveys and focus groups, aim to elucidate better ethnic group differences in services desired, services received, and satisfaction with services.

In considering the potentially biasing factor of the client's regional center, however, there were clear variations in per capita expenditures across regional centers that were not accounted for by the consumer characteristics employed in the current statistical modeling. Certain differences across regional centers in their average consumer service costs may well be due to legitimate cost-related variables that were unavailable in the current study (e.g., client medical conditions; availability and/or cost of services in the catchment area; parent or family ability and/or willingness to access services; service coordinator caseload or availability). The remaining two reports to be delivered under this contract will strive to understand better the bases for differences across regional centers in their average expenditures, using survey and focus group data to illuminate the service delivery process.

## I. INTRODUCTION

In the 19991 Budget Act, Item 4300-001-0001, Provision 4, stated that the California State Department of Developmental Disabilities should conduct an analysis of the purchase of services (POS) through the 21 regional centers across the State. The purpose of that study was to identify the factors that contribute to variation in the POS for persons with developmental disabilities. The resulting report, dated April 1999, provided an initial examination of the variation in POS due to various factors. That report discussed trends in purchase of services showing wide variation across regional centers in average service costs as well as very large differences in the average purchase of services for persons from different ethnic groups.

In the current report, we examine the patterns of purchase of services (POS) for persons with mental retardation and developmental disabilities through the 21 regional centers across the State of California. For comprehensiveness, we analyzed data from five fiscal years, from 1995-1996 through 1999-2000. However, before launching into a description of the manner in which we analyzed the data and then the results we observed, we first set the stage for our analyses by presenting two hypothetical examples that will lend credence to our approach.

### **Cautionary Tale #1: Failure to Control Relevant Explanatory Variables**

Consider the following hypothetical example: A researcher was nominated by her university president to conduct a study of possible gender discrimination in salary for the younger faculty members at the university. The researcher was given access to data on all assistant and associate professors in a random sample of departments. The sample consisted of 59 female and 141 male faculty members distributed across the assistant and associate professor levels. The researcher computed the average salaries paid to assistant professors and associate professors and then computed the average salaries paid to female and male faculty members. The first finding was that assistant professors were paid an average of \$ 31,182 in annual salary, which was much less than the \$ 45,298 that associate professors were paid; these findings were fully expected and were neither surprising nor especially notable. But, the researcher next examined the average salaries as a function of gender and found that the women faculty were paid an average of \$ 37,085 in annual salary, whereas the men were paid an average of \$ 42,128. Supporters of the call for a study of gender discrimination in salaries urged the researcher to report the findings to the university president and publish the results in a professional journal, to correct the inequity in salary levels for men and women.

However, the researcher had misgivings about the results. In particular, the researcher had looked at the salaries earned by male and female faculty members as a function of their level of appointment; this information is shown in Table I.1. In this table, the average salaries for women and men at the two different levels (assistant professor and associate professor) are shown. The average salary figures in Table I.1 troubled the researcher: At both the assistant and associate professor levels, women earned an average of \$ 2,000 *more* than men, yet the marginal means

told a different story. That is, at the assistant professor level, women earn \$ 2,000 more than men (\$ 32,000 vs \$ 30,000); at the associate professor level, women again earned \$ 2,000 more than men (\$ 47,000 vs \$ 45,000). If this is so, how can the marginal means show the opposite trend: that women earn over \$ 5,000 less than men (\$ 37,085 vs \$ 42,128)?

**Table I.1**

Average Salaries for Professors Arrayed by Gender: Weighted Marginal Means

	Assistant Professor	Associate Professor	Weighted Marginal Mean
Women	\$ 32,000 (N = 39)	\$ 47,000 (N = 20)	\$ 37,085 (N = 59)
Men	\$ 30,000 (N = 27)	\$ 45,000 (N = 114)	\$ 42,128 (N = 141)
Weighted Marginal Mean	\$ 31,182 (N = 66)	\$ 45,298 (N = 134)	\$ 40,640 (N = 200)

The answer to this apparent paradox is the nature of the marginal means calculated from the cell means shown in Table I.1. If one simply calculates the mean income of women faculty – without regard for their level of appointment – one obtains the answer shown in Table I.1: Women, on average, are paid less than men. That is, 39 women at the assistant professor level had a mean salary of \$ 32,000 and 20 women at the associate professor level earned an average of \$ 47,000. The weighted mean of these values is:

$$\frac{(39 \times 32,000) + (20 \times 47,000)}{(39 + 20)} = 37,085$$

A comparable calculation for the men yields the average salary of \$ 42,128 shown in Table I.1. Thus, the weighted marginal means shown in Table I.1 provide an answer for the question “Do women and men have equal levels of salary, or does one group earn more than the other?” Thus, without regard to other factors – such as job level – the weighted marginal means show that, on average women earn over \$ 5,000 less than men.

However, earnings questions often revolve around whether there is gender discrimination in pay *for the same work*. That is, we usually want to know **whether men and women are paid**

**the same for the same job.** The weighted marginal means do not answer this question. This fact is shown by looking at the cell means in Table I.1. These show that (a) at the assistant professor level, women are paid more for the “same” job (\$ 32,000 vs \$ 30,000), and (b) at the associate professor level, women are again paid more for the “same” job (\$ 47,000 vs \$ 45,000). So, women – in this hypothetical example – consistently earn **more** for the same job when we look at the cell means, but appear to earn **less** for the “same” job (the job of professor) when we look at the weighted marginal means. The discrepancies for these two types of means – cell means and marginal means – is the result of the very different numbers of men and women at the two job levels: about 67% of the women in the sample (or 39 of 59) held lower paying assistant professor position, whereas over 80% of the men in the sample (or 114 of 141) held higher paying associate professor positions. Thus, even though women received more pay than men at both the assistant and associate professor levels, the “average” woman – disregarding level of appointment – made less than the “average” man.

The solution to this dilemma is to compute least squares means, which are shown in Table I.2. In this table, the information in the four cells (the means and sample sizes) are identical to those in Table I.1. What differs is the calculation of the marginal means.

**Table I.2**

Average Salaries for Professors Arrayed by Gender: Least Squares Means

	Assistant Professor	Associate Professor	Least Squares Mean
Women	\$ 32,000 (N = 39)	\$ 47,000 (N = 20)	\$ 39,500 (N = 59)
Men	\$ 30,000 (N = 27)	\$ 45,000 (N = 114)	\$ 37,500 (N = 141)
Least Squares Mean	\$ 31,000 (N = 66)	\$ 46,000 (N = 134)	\$ 38,500 (N = 200)

The least squares means are calculated as unweighted means of the cell means. Thus, to estimate the amount paid to women, one would simply average the two cell means pertaining to women, or \$ 32,000 and \$ 47,000, arriving at the mean of \$ 39,500. A similar calculation yields the mean of \$ 37,500 for men.

Two additional comparisons of Tables I.1 and I.2 should be noted. First, the weighted marginal and least squares means agree fairly well on the pay differential between assistant and

associate professors: The weighted marginal means estimate that associate professors earn about \$ 14,100 more than assistant professors, whereas the least squares means provide an estimate of exactly \$ 15,000 for the difference in salaries. Therefore, the weighted marginal means and least squares means can agree fairly well – and “get the answer right” – for one part of an analysis (here the difference in salary for assistant and associate professors), even though they provide very different answers for another part of the analysis (for example, the average salaries for men and women). With regard to this latter aspect, the least squares means “got the answer right” because women consistently received higher salaries for the same job classifications; the weighted marginal means thus gave the incorrect answer.

Second, even the overall average salary is calculated differently in the two cases. The weighted marginal mean procedure yields an average salary of \$ 40,640 across all persons in the analysis, whereas the least squares means give an estimate of \$ 38,500. Thus, even so basic a number as the average salary paid has different answers, depending on how this quantity is estimated.

Each method of estimation – weighted marginal means versus least squares means – provides an answer to a particular question, but the precise form of the question is often implicit and not well articulated. But, we have seen that only the least squares means get all of the answers “right” in our hypothetical salary example. The reason for the superior performance of the least squares means is the fact that this method of estimation controls statistically for other factors that may influence salary. That is, when asking about the average salaries for women and men, their level of appointment (assistant vs associate professor) was controlled because level of appointment will surely affect one’s salary. Thus, with regard to the question regarding equal pay for equal work, the answer is clear that women earn more than men for the same work. Now, one might wonder why so few women were employed (that is, only 33% of the sample, or 66 of 200 persons, were women), and one might have severe concerns about why only 33% of the women were in the higher paid associate professor category, whereas over 80% of the men were in this category of job. But, questions regarding differential hiring rates for men and women or differential promotion rates for men and women – while being perfectly valid and important questions – are not the same as the question regarding equal pay for equal work. And, with regard to this latter question, only the least squares means “got the answer right.”

We called this a “cautionary tale” for the Purchase of Services II Study, because of the trends that were discussed in the original Purchase of Services study of April 1999. In that study, average expenditures were calculated for each regional center, and differences in expenditures appeared to be fairly large. In addition, average expenditures were calculated for different ethnic groups; once again, substantial variation between ethnic groups were noted. However, these means were, in essence, weighted marginal means, as other factors were not controlled. In the present report, we will present analyses of purchase of service data in two ways – not controlling for other factors and then controlling for other factors. When we fail to control for other factors, we should observe the trends reported in April 1999 in the first Purchase of Service study report. When we then control for other factors, we will be interested to see if similar trends are evident in the data or whether trends are importantly altered.

## **Cautionary Tale #2: Oddities of Cost Variables**

A second cautionary tale concerning problems in the analysis of cost variables can be told quickly. These problems involve difficulties in arriving at meaningful characterizations of average values for highly skewed data. Consider a group of four people who were on a subway train, commuting to work. Each of the four persons earned an average salary of \$ 40,000 per year. At the next stop, Bill Gates stepped on the subway train. One of the subway riders turned to the other three and said “Isn’t America great! The average annual income last year of everyone on this train car was over one billion dollars.”

The point of this cautionary tale for the current project is this: many times, dollar amounts (that is, purchase of service expenditures) are highly skewed, with many persons having relatively low values on a dimension and a relatively small number of persons having very large values. Attempting to characterize “average” expenditures in such a situation can be a surprisingly difficult problem. The DDS system provides services to between 110,000 and 150,000 persons every year. Whether within a given cost category or for the sum of all services received, a small number of consumers may have rather large costs for services. If the consumers with large service costs are not distributed evenly as a function of other variables, such as age, ethnicity, or regional center, then differences may arise as a function of a few unrepresentative cases.

Even elementary statistics books discuss the availability of different statistical indicators of the location or “midpoint” of a distribution. Most commonly, researchers rely on the mean, or average, to characterize the location of a distribution. Other common statistics are the median and the mode; the median is the score that falls in the middle of the distribution (with 50% of scores above and 50% below the median), and the mode is the most frequently observed score. The median and mode are much less affected by outlier values. Indeed, in the “subway rider” example above, neither the median nor the mode would be affected by whether Bill Gates was on the train car or not. However, our standard methods of analysis – the powerful methods we have to model trends in data using regression analysis – typically rely on methods that are based on the mean and deviations about the mean.

Given the sensitivity of the mean and of our typical methods of analysis to outlier values and the likelihood that outliers will be present in the purchase of services data, several approaches will be taken to evaluate the influence of outliers on results presented. The details of these methods will be discussed below. Here, we merely wanted to alert readers to the problems that often arise with monetary data, problems that necessitate modifications to our most direct ways of analyzing data.

### **III. FACTORS INFLUENCING PURCHASE OF SERVICES**

In this section, we will discuss several factors that may influence the patterns of purchase of services through the 21 Regional Centers across California for persons with mental retardation and developmental disabilities. We will discuss these factors under three headings: potential biasing factors, likely causal factors, and omitted variables.

#### **A. POTENTIAL BIASING FACTORS**

We can identify three factors that, if significant statistically or practically, would indicate some form of bias in the purchase of services for persons with mental retardation and developmental disabilities through the 21 regional centers around the State of California. These three factors are (a) the Regional Center providing services to the consumer, (b) the gender of the consumer, and (c) the ethnicity of the consumer. We discuss each of these factors in turn below.

Regional center. The first potential bias factor is the Regional Center providing services to a client. Suppose we observe wide variations across Regional Centers the dollar amount of services provided to clients. In the 1999 POS study, considerable variation was reported in the average dollar amount of services provided to clients. If the current analyses confirm these differential patterns of expenditures, the implication would be that the services an individual was likely to receive might be as much a function of the particular regional center through which s/he receives services as the services the consumer truly needs. That is, the individual might receive a particular pattern of services through one regional center, then move across the street and into the catchment area of a neighboring regional center and begin receiving a rather different pattern of services.

At the outset, we acknowledge the difficulties that arise when attempting to determine differential patterns of service delivery across regional centers. As will be noted later, each of the 21 regional centers across California has a unique consumer base, a unique blend of socio-economic surroundings, and a unique pattern of availability of service providers in close proximity to consumers. When we obtain estimates of the average service expenditures for each regional center, we obtain a very rough estimate of an average dollar amount that may have arisen from many, many factors that were not included in our analyses. Once we control for variables that reside on the data set, if substantial variation across regional centers is observed, this will need to be investigated in greater detail. But, central to our research project is the accurate estimation of average expenditures for each regional center after controlling for several aspects of the consumers at each regional center. Previous estimates of average expenditures, particularly in the April 1999 report, may have been seriously biased, and our principal aim in the current report is to replicate previous findings and then compare these with outcomes when other factors are controlled statistically. The latter estimates are the ones that should be interpreted, because they represent less biased estimates of regional center effects.

Gender. The second potential biasing factor is the gender of the consumer. Clearly, if service expenditures vary considerably as a function of gender of the consumer, after controlling for other factors, then some bias would be evident in the provision of services. In previous work on adaptive and maladaptive behavior, gender almost never had a practically significant effect on adaptive or maladaptive behaviors. Given the similarities between males and females in their levels of adaptive and maladaptive behavior, similarities in service provision was expected.

Ethnicity. The third factor representing potential bias in purchase of services is the ethnicity of the consumer. In the initial Purchase of Services study of April 1999, mean expenditures were reported for different ethnic groups, and these means appeared to vary in practically important ways. Specifically, the average amount of services (in dollars) provided to Hispanic consumers was approximately one-half the dollar amount spent on White, or Euro-American, consumers. A finding of large mean expenditure differences for consumers in different ethnic groups in the current study would lead to strong recommendations to uncover the biases in service provision for consumers in these various ethnic groups.

However, the purported differences in mean service expenditures across ethnic groups may be an artifactual outcome. As noted earlier, the means discussed in the April 1999 report were equivalent to weighted marginal means, which implies that other factors that can and should influence service costs were not controlled when these means were calculated. One key goal of the current study is to contrast estimated mean expenditures for consumers in different ethnic groups in uncontrolled analyses with estimated mean expenditures for those same consumers when other factors are controlled. These latter means with other factors controlled are least squares means and represent the average expenditures when other factors are held constant statistically. If these still show large variation across ethnic groups, then a large and comprehensive analysis should be undertaken to understand the eliminate the sources of bias in service delivery.

## **B. LEGITIMATE COST-RELATED FACTORS**

In addition to potential bias factors, at least five classes of influences were included in the DDS data set that are likely to influence purchase of services in a legitimate fashion. These five classes of factors are: (a) the age of the consumer, (b) the type of residence in which the consumer lives, (c) the general category into which the consumer is allocated, (d) the client's level of mental retardation, and (e) the levels of adaptive and maladaptive behavior exhibited by the consumer.

Consumer chronological age. The chronological age of the consumer (hereinafter referred to simply as "age") should have influences on the purchase of services, based on the manner in which the DDS system operates. Identification of an individual as requiring services is systematically related to age at identification. That is, infants and children who are identified as needing services are likely to be more seriously affected (e.g., more likely to have profound mental retardation or an organic disability such as cerebral palsy). Thus, infants and children who are identified prior to elementary school may have serious physical problems, may be medically fragile, and therefore require high dollar amounts of service.

During the school years, additional persons are identified as needing services under listings that are relevant to the DDS system. For example, many children who have mental retardation are first identified during the elementary school years, after having been referred for difficulties in handling course work. These children tend to be less seriously impaired as those identified at an earlier age, but still require services. However, the services received during the years of schooling (roughly between the ages of 5 and 20 years) are often obtained through non-DDS agencies. Therefore, during the years of schooling, purchase of services through DDS may be at a relatively low level. Then, after aging out of the school system, these individuals may require services during adulthood, so their service utilization through the DDS system should increase dramatically as they enter early adulthood and remain high thereafter.

Residence type. The home or facility in which a person resides may have reasonable influences on purchase of services. If a consumer is living in the home of his or her parents, the consumer may use certain services. But, parents often are responsible for many of the common costs of providing food or shelter as would be the case for a child with no developmental disability. On the other hand, if a consumer lives in a community facility, then many usual costs for food, shelter, clothing, and personal items may be supplied through the DDS system. Thus, the type of residence in which a consumer lives should have systematic influences on the pattern of services received and the costs incurred in providing these services.

Consumer category. Consumer category is a term that describes the primary categorical code under which a consumer is classified. Relevant codes are autism, behavior adjustment, and child development. Although the categorical codes are not fully descriptive in themselves, the codes reflect aspects of the program of service a consumer is likely to need. Thus, children and adolescents with autism require intensive services of several types that are likely to be different than the pattern of services supplied for a person in the “habilitation” category. Because these consumer categories are shorthand indicators for the patterns of services that are likely to be provided to persons in different categories, we used the consumer category information as a proxy for legitimate needs for differential patterns of service.

Consumer level of mental retardation. The DDS system provides services for persons with mental retardation and developmental disabilities, and level of mental retardation almost surely will influence the pattern of services delivered. Consumers with severe or profound mental retardation usually require much more intensive services of various kinds than do persons with mild or moderate mental retardation. Moreover, persons with developmental disabilities who do not have mental retardation will necessarily have a different pattern of service needs. As the pattern of needed services varies, the costs associated with those services will also vary.

Consumer levels of adaptive and maladaptive behavior. Because the Client Development Evaluation Report (CDER) must be completed on persons receiving services through the DDS system, availability of scores on dimensions of adaptive and maladaptive behavior may be predictive of patterns of services beyond the factors identified above. One particular a priori prediction is that parents/guardians of consumers with higher levels of maladaptive behaviors will request higher levels of respite services than parents/guardians of consumers with relative low levels of maladaptive behavior.

### C. OMITTED VARIABLES

After discussing both potential bias factors and factors that might legitimately influence purchase of services, we would be remiss if we did not discuss the problem of omitted variables. Any statistical analysis is only as good as the variables included in the analysis. Moreover, if important variables that influence the outcome variable are omitted from the analysis, the result will be a failure to model with great precision the process generating the data. This problem is not unique to the current analyses; indeed, every analysis of data ever undertaken is potentially flawed by the failure to include relevant predictors. In this section, we will discuss briefly three variables or sets of variables that were not included in the data set, yet are likely to influence the provision of services to consumers.

Consumer level of health problems or morbidity. Individual-level indicators of health problems or morbidity were not included in the data set, but such indicators of health status are likely to influence several categories of service. Principal among these is medical care costs; the greater the number and severity of health problems a consumer has, the greater the likely medical care costs incurred in treating these problems. Of course, health problems vary along several dimensions, such as acute versus chronic, mild to severe, etc. As a result, obtaining the types of health problem indicators that would be strongly related to services consumed would be a difficult undertaking, as many medical care costs are incurred in treating fairly episodic and unpredictable health problems, such as sickness.

Differences in knowledge regarding available services. Parents/guardians of persons with mental retardation are likely to have differing levels of knowledge about the kinds of services available for the consumer under their care. Some parents/guardians may be extremely knowledgeable about the entire range of services available for consumers, whereas other parents/guardians may have detailed knowledge of only limited forms of available service. No parents/guardians information was available on the DDS data set containing purchase of services, so effects of differential parents/guardians knowledge of DDS services could not be evaluated.

Perceived need or desire for services. In addition to knowledge of available services, parents/guardians almost certainly vary widely in their perceived need or desire for certain kinds of service. In-home respite and out-of-home respite services may be readily available for parents/guardians who need such services. But, for any of a multitude of reasons, a parent/guardian may be uninterested in receiving any form of respite services. In the previous paragraph, we mentioned differences among parents/guardians in their knowledge of available services. When dealing with perceived needs or desires for service, one is confronting parent/guardian preferences for services or preferences to forego certain services. The DDS system cannot force services on consumers or parents/guardians who prefer not to use those services. Still, these preferences regarding services may be particularly powerful influences on the pattern of services a consumer receives, and failing to have measures of such preferences almost surely ensures that we will be unable to capture fully the patterns of service delivery received by consumers.

Omitted variables and the resulting bias in estimates. In summary, we simply wanted to

note that all persons associated with the current analyses must acknowledge that many variables that should be available to capture precisely the manner in which services are delivered to consumers are unavailable for analysis. Some of these variables could conceivably be assessed, others are virtually immune to careful measurement. With the omission of these variables from our analyses, we acknowledge at the outset that biases will be present in the analyses. However, our task is to attempt to characterize the service delivery costs for clients within the DDS system using the data available to us. If the results will be necessarily biased, this should not stop us from pursuing a “broad strokes” analysis of purchase of services for consumers associated with the DDS system. We will, given the variables available to us, provide estimates of service costs that control for various factors, enabling us to characterize the relative magnitude of cost differentials associated with various predictors. If cost differentials with regard to a given bias factor, such as ethnicity, are eliminated after controlling other variables, then the omitted variables were not needed. On the other hand, if cost differentials related to the bias factor are substantially reduced, but not eliminated, we enter a gray area. At least two states (or more) may be true: (a) there may indeed be bias in the system, leading to provision of greater dollar amounts of services to consumers of certain ethnic groups, or (b) certain variables that would explain the differential service delivery costs were omitted from the analyses, leading to bias in the estimated cost expenditures, *not* bias in the service delivery system. Although we may never be able to identify which of these states is true, we can characterize the magnitude of the differential levels of service costs and attempt to determine whether the remaining differential costs are of practical importance.

#### **D. CORRELATIONS AMONG PREDICTORS**

One important aspect of the purchase of service data that must be confronted is the inevitable correlations among predictors of service costs. Most of the predictors of purchase of services are categorical variables. For example, an individual consumer is either a male or female, belongs in only one of the ethnic status categories, etc. But, regardless of the categorical nature of these variables, we can still discuss the correlations, or lack of independence, among variables.

With continuous variables, correlations among variables can be captured easily by a scatterplot. One variable is assigned to the horizontal axis, the other to the vertical axis, and individual data points are plotted in the space. A scatterplot of this sort is often very useful information for deciding whether the relation between two variables is linear or some more complex nonlinear form.

With categorical variables, a scatterplot is less useful, because there is no natural ordering of values on the categorical variable. That is, we have no basis for saying that males or females are “higher” on the gender variable, even if we assign values of 0 and 1 to identify males and females. Instead of a scatterplot, a cross-tabulation table is a useful way of investigating the correlation, or lack of independence, between variables. For example, consider Table III.1, which gives a cross-tabulation of ethnic status of consumers and the regional centers around the State of California. The values shown in Table III.1 are the number (or frequency) of consumers from each regional center who fell into each of the ethnicity categories and the resulting

percentage of the consumers from the regional center who are of that ethnicity; the data in Table III.1 are from the 1995-96 fiscal year. For example, 346 consumers at the Alta Regional Center were Asian, and Asian consumers comprised 4.70% of the Alta Regional Center caseload served during 1995-96. In comparison, an almost identical number of Asian consumers were served by the Central Valley Regional Center (345); but, given the lower overall caseload of this center, the 345 Asian consumers constituted a larger percentage (5.34% vs. 4.70%) of the Central Valley overall caseload.

Study of Table III.1 will reveal that the 21 regional centers have rather different overall caseloads, from a high of 10,476 for the Inland Regional Center to a low of 1,486 for the Redwood Coast Regional Center. [Note: These numbers of consumers are the numbers of consumers with CDER data, not the total caseloads for the 21 regional centers. A total of 111,672 consumers had CDER data in the 1995-96 cost dataset, even though over 140,000 consumers were on the overall cost data set.].

Given the rather different caseloads for the regional centers, independence of the regional center and ethnicity variables would be shown by identical row percentages of each ethnicity in the table. For example, the last row of Table III.1 shows that 25.04% of consumers throughout the State of California were Hispanic. If persons of different ethnicity were equally distributed across the state and across the catchment areas for the regional centers, then an equal percentage of Hispanic consumers would be noted in each center. This clearly is not the case, as over 64% of consumers served by the East Los Angeles Regional Center were Hispanic, whereas only about 5% of the consumers at the Far Northern and Redwood Coast Regional Centers were Hispanic. Similar, wide fluctuations are observed for all ethnic groups. For example, over 80% of the consumers at the Redwood Coast Regional Center were White, whereas less than 13% of the consumers at the South Central Los Angeles Regional Center were White. Or, over 42% of the consumers at the South Central Los Angeles Regional Center were Black, whereas fewer than 2% of the caseloads of several regional centers around the state were Black.

A moment of consideration will lead to interesting questions: If we find regional center variation in services provided, is this variation due to differential availability of services in the local regional center area, to a different philosophy regarding service provision across centers, or because the centers have different percentages of persons of certain ethnicity? Or, if persons from a given ethnic group have different levels of service provision, is this due to discrimination against their ethnic group or because they are in the catchment area of a regional center that has a particular philosophy of service provision? Or, could differential costs for regional centers and differential costs for different ethnic groups be due to other factors? What other factors are possible? We have several other factors in the data set.

**Table III.1**

## Distribution of Client Ethnicity by Regional Center

Regional Center		Ethnicity									Total
		Asian	Black	Fili-pino	His-panic	Native Am	Other	Poly-nesian	Un-known	White	
Alta	Number	346	776	61	665	44	383	16	229	4849	7369
	Pct	4.70	10.53	0.83	9.02	0.60	5.20	0.22	3.11	65.80	
Central Val.	Number	345	359	35	2379	28	276	1	135	3027	6585
	Pct	5.24	5.45	0.53	36.13	0.43	4.19	0.02	2.05	45.97	
East Bay	Number	534	1655	204	811	20	585	8	55	3538	7410
	Pct	7.21	22.33	2.75	10.94	0.27	7.89	0.11	0.74	47.75	
East Los Ang.	Number	303	47	45	2326	1	201	2	11	688	3624
	Pct	8.36	1.30	1.24	64.18	0.03	5.55	0.06	0.30	18.98	
Far Northern	Number	55	59	6	176	71	121	1	4	2770	3263
	Pct	1.69	1.81	0.18	5.39	2.18	3.71	0.03	0.12	84.89	
Golden Gate	Number	561	521	274	696	8	308	31	24	2197	4620
	Pct	12.14	11.28	5.93	15.06	0.17	6.67	0.67	0.52	47.55	
Harbor	Number	369	689	173	1423	11	309	24	184	2205	5387
	Pct	6.85	12.79	3.21	26.42	0.20	5.74	0.45	3.42	40.93	
Inland	Number	174	1154	76	2915	65	390	25	13	5664	10476
	Pct	1.66	11.02	0.73	27.83	0.62	3.72	0.24	0.12	54.07	
Kern	Number	17	304	30	865	16	98	2	18	1578	2928
	Pct	0.58	10.38	1.02	29.54	0.55	3.35	0.07	0.61	53.89	
Lanterman	Number	262	367	105	1368	8	272	5	109	1290	3786
	Pct	6.92	9.69	2.77	36.13	0.21	7.18	0.13	2.88	34.07	
North Bay	Number	53	243	70	271	7	216	3	48	2157	3068
	Pct	1.73	7.92	2.28	8.83	0.23	7.04	0.10	1.56	70.31	

**Table III.1** (continued)

## Distribution of Client Ethnicity by Regional Center

Regional Center		Ethnicity									Total
		Asian	Black	Fili-pino	His-panic	Native Am	Other	Poly-nesian	Un-known	White	
North LA	Number	155	427	103	1476	24	336	1	27	2941	5490
	Pct	2.82	7.78	1.88	26.89	0.44	6.12	0.02	0.49	53.57	
Orange	Number	672	159	69	1633	13	385	12	11	4603	7557
	Pct	8.89	2.10	0.91	21.61	0.17	5.09	0.16	0.15	60.91	
RedwdCoast	Number	24	21	1	67	57	58	2	22	1234	1486
	Pct	1.62	1.41	0.07	4.51	3.84	3.90	0.13	1.48	83.04	
San Andreas	Number	417	201	150	1321	19	319	13	77	2807	5324
	Pct	7.83	3.78	2.82	24.81	0.36	5.99	0.24	1.45	52.72	
San Diego	Number	263	781	225	2279	44	655	18	274	4829	9368
	Pct	2.81	8.34	2.40	24.33	0.47	6.99	0.19	2.92	51.55	
San Gab/Pom	Number	319	511	94	2292	11	268	12	75	2461	6043
	Pct	5.28	8.46	1.56	37.93	0.18	4.43	0.20	1.24	40.72	
South Ctl LA	Number	32	2072	15	2051	8	90	6	18	630	4922
	Pct	0.65	42.10	0.30	41.67	0.16	1.83	0.12	0.37	12.80	
Tri-Counties	Number	69	142	52	1210	15	313	1	141	2784	4727
	Pct	1.46	3.00	1.10	25.60	0.32	6.62	0.02	2.98	58.90	
Valley Mtn	Number	216	354	59	933	27	272	2	131	2928	4922
	Pct	4.39	7.19	1.20	18.96	0.55	5.53	0.04	2.66	59.49	
Westside	Number	111	942	36	808	3	190	9	71	1147	3317
	Pct	3.35	28.40	1.09	24.36	0.09	5.73	0.27	2.14	34.58	
Total	Number	5297	11784	1883	27965	500	6045	194	1677	56327	111672
	Pct	4.74	10.55	1.69	25.04	0.45	5.41	0.17	1.50	50.44	

Consider next the factor of chronological age, specifically the cross-tabulation of consumer age and consumer ethnicity, shown in Table III.2, again for the 1995-96 fiscal year. The consumer age categories consist of age ranges, specifically 0-2 years (infancy), 3-11 years (childhood), 12-22 years (adolescence), 23-44 years (early adulthood), and 45+ years (later adulthood). Any detailed consideration will reveal that there are notable ethnic group variations in the age of consumers. For example, about 58% of the Asian consumers and over 62% of the Hispanic consumers were in the childhood and adolescence age categories (i.e., between 3 and 22 years of age), the highest percentages of children and adolescents for any of the identified ethnic groups. In contrast, fewer than 36% of the White consumers fell in these age categories. The remaining ethnic groups had percentages of children and adolescents that fell between these extremes. And, over 63% of the White consumers were in the early and later adulthood categories (aged 23 years or older), whereas between 36 and 41% of the Asian and Hispanic consumers were in these two older age categories. Again, consumers in other ethnic groups had concentrations between these extremes.

Given the lack of independence of ethnic status and age, the large variation in service costs across ethnic groups discussed in the April 1999 report is open to alternative explanation: Rather than the differential service costs for different ethnic groups being due to bias in the service delivery system, the differential costs may have arisen from the differential age distribution of consumers from the different ethnic groups. If the clear majority of Asian and Hispanic consumers are children and adolescents and the clear majority of White consumers are in adulthood, then higher services costs for White consumers in comparison to Asian and Hispanic consumers may result from the different pattern of services routinely provided for adults in comparison to children and adolescents, rather than bias against Asian and Hispanic consumers.

Additional tables such as Tables III.1 and III.2 could have been formulated, cross-tabulating levels of each pair of variables from the 1995-96 fiscal year. Further, similar tables could be presented for the remaining four fiscal years under investigation, fiscal years 1996-97 through 1999-2000. To save space, these tables will not be presented. But, we emphasize here that none of the eight variables along which consumer characteristics are arrayed is independent of the others. The lack of independence of predictors dictates a need to approach analyses with a carefully prepared analytic strategy that controls for legitimate cost-influencing factors before evaluating potential bias factors. This strategy is discussed in the next section.

**Table III.2**

## Distribution of Client Ethnicity by Age Group

		Age Group					Total
		0-2 years	3-11 years	12-22 years	23-44 years	45+ years	
Asian	Number	72	1520	1539	1855	311	5297
	Pct	1.36	28.70	29.05	35.02	5.87	
Black	Number	53	3220	2746	4801	964	11784
	Pct	0.45	27.33	23.30	40.74	8.18	
Filipino	Number	17	453	536	769	108	1883
	Pct	0.90	24.06	28.47	40.84	5.74	
Hispanic	Number	496	9582	7858	8335	1694	27965
	Pct	1.77	34.26	28.10	29.81	6.06	
Native American	Number	3	126	104	197	70	500
	Pct	0.60	25.20	20.80	39.40	14.00	
Other	Number	100	2493	1698	1517	237	6045
	Pct	1.65	41.24	28.09	25.10	3.92	
Polynesian	Number	1	65	49	72	7	194
	Pct	0.52	33.51	25.26	37.11	3.61	
Unknown	Number	85	780	324	372	116	1677
	Pct	5.07	46.51	19.32	22.18	6.92	
White	Number	299	9975	10208	25225	10620	56327
	Pct	0.53	17.71	18.12	44.78	18.85	
Total	Number	1126	28214	25062	43143	14127	111672
	Pct	1.01	25.27	22.44	38.63	12.65	

### **III. APPROACH TO ANALYSES**

When exploring the factors that may influence purchase of services, one must design an approach to data analyses that is responsive to the nature and distribution of both independent and dependent variables. Moreover, this analytic approach must be consistent with what is known about the way the data were generated. In the current application, the analyses should take into account what is known about the ways in which Regional Centers provide services for consumers.

Ideally, service coordinators work in collaboration with parents/guardians to evaluate the status of a person receiving services from the Regional Center. This collaboration will lead to the dollar amount and variety of services that are arranged for the individual consumer.

#### **Purchase of Service Categories**

The outcomes for the current study were the per capita costs for purchase of services in different categories. These categories of service were developed by DDS and the regional centers and serve as a useful taxonomy of types of service available to consumers. The cost categories were: (a) out of home, (b) day programs, (c) transportation, (d) medical care, (e) in-home respite, (f) out-of-home respite, (g) other non-medical services, (h) support services, and (i) POS total (standing for “purchase of services total”), which was the sum of cost for services in categories (a) through (h). Additional information on these cost categories, including account and service code information, is given in Appendix A.

We had available cost and consumer information for five fiscal years, the fiscal years of 1995-96 through 1999-2000. Therefore, we pursued five sets of analyses, one set of analyses for each of these fiscal years. Having information for five consecutive fiscal years was a great benefit, both to cross-validate trends across fiscal years as well as to uncover any trends across fiscal years.

#### **Coding of Predictor Variables**

Regional center. The 21 regional centers in the State of California were coded using a set of 20 pseudovariates, as is standard practice. Any variation in service costs associated with regional centers is associated with the 20 degrees of freedom representing differences among the 21 centers.

Gender. The gender of the consumer was also coded with a pseudovariate, with a code of 0 for male and 1 for female. Thus, any variation in service deliver costs is associated with a single degree of freedom associated with consumer gender.

Ethnic status. Consumers were identified as belonging to one of nine ethnic categories, which are (alphabetically) Asian, Black, Filipino, Hispanic, Native American, Other, Polynesian,

Unknown, and White. Here, 8 pseudovariates were specified to capture differences among ethnic groups.

Consumer chronological age. A choice is open when modeling the relation between consumer chronological age and expenditure patterns. This choice is between leaving chronological age in a continuous form, such as year of age, versus constructing age categories. When we received the data set from DDS, a categorical form of chronological age had been constructed. This categorical form had the following categories: 0-2 years (or infancy), 3-11 years (or childhood), 12-22 years (or adolescence), 23-44 years (or early adulthood), and 45+ years (or later adulthood). The advantage of this categorical system is that it is related to expected patterns of service usage. Consumers identified during infancy are likely to be more severely retarded than those identified at later ages, so service costs should be rather high for this group. The childhood and adolescence age categories span the years of schooling; because consumers often receive services from other agencies during the schooling years. Then, after consumers have “aged out” of schools and into the adult years, consumers often show a greater reliance on DDS sources of support, leading to higher levels of expenditure through the regional center system. Thus, the categorical treatment of age appears to capture expected expenditure patterns better than the continuous form, so all analyses of effects of chronological age used this categorical form. Thus, 4 pseudovariates were used to represent the differences in expenditures for the five age groups.

Consumer residence type. The types of residences in which consumers resided were supplied by DDS in the following categories: (a) home of parent or guardian, (b) independent living, (c) community care facility (or CCF), (d) intermediate care facility (or ICF), (e) skilled nursing facility (SNF), or (f) other. As a result, 5 pseudovariates were used to represent cost differences as a function of types of residence.

Client Characteristic. The client identifier titled “client characteristic” is a variable that designates the primary types of programs that the client receives, based on his or her presenting symptoms. The levels of client characteristic were: (a) autism, (b) behavior adjustment, (c) child development, (d) habilitation, (e) medical, (f) physical development, (g) physical-social development, (h) sensory, and (i) social development. As should be clear, these labels are not transparent labels that allow a direct identification of all programs that a given consumer was likely to receive. However, because consumer patterns of purchase of services may vary as a function of the “client characteristic” variable, we used 8 pseudovariates to represent the differences among the 9 categories on this variable.

Consumer level of mental retardation. The consumer level of mental retardation was categorized into six levels: (a) 000.0, or no retardation; (b) 317, or mild mental retardation; (c) 318.1, or moderate mental retardation; (d) 318.2, or severe mental retardation; (e) 318.3, or profound mental retardation; and (f) 319, or unspecified level of mental retardation. Our a priori hypothesis was that consumers with more severe levels of mental retardation were likely to require higher levels of service than were those with less severe mental retardation. We used 5 pseudovariates to represent differences among the six categories on the level of mental retardation variable.

Consumer level of adaptive and maladaptive behavior. With the availability of scores from the CDER, we formulated scores on four dimensions of adaptive behavior and two dimensions of maladaptive behavior, based on research on the CDER by Widaman, Gibbs, and Geary (1987). The four dimensions of adaptive behavior were (a) motor competence (sum of 12 CDER items), (b) independent living skills (sum of 9 CDER items), (c) cognitive competence (sum of 14 CDER items), and (d) social competence (sum of 6 CDER items); the two dimensions of maladaptive behavior were (a) social maladaptation (or aggression against other persons or property; sum of 9 CDER items), and (b) personal maladaptation (or self-injurious behaviors; sum of 7 CDER items). Additional information about which CDER items contribute to each of these dimensions is contained in the Widaman et al. (1987) paper.

We converted scores on these six CDER dimensions to a z-score metric based on data from the first fiscal year, 1995-96. That is, we used the mean and standard deviation (SD) of scores on each dimension in 1995-96 to convert all measures to z-scores. As a result, the scores on each of the dimensions had a mean of zero and SD of 1.0 for the 1995-96 fiscal year, and means and SDs that were slightly different from 0 and 1, respectively, in later years, but were calculated with reference to the 1995-96 year data. Thus, if the mean cognitive competence score was greater than 0 in a later fiscal year, this would indicate a somewhat higher score on the cognitive competence dimension in that fiscal year in comparison to the 1995-96 fiscal year.

### **Order of Estimating Effects of Cost-Related Factors**

When modeling the relations of consumer characteristics on purchase of services, we performed the following sets of analyses. First, we separately estimated the effect of each predictor variable in an analysis in which it alone was the sole predictor of variation in purchase of services.

Then, we performed analyses in which we estimated relations of predictors when controlling for other factors. In doing so, we first estimated the effects of legitimate cost-related factors, estimating the effects of the following variables in the following order: (a) chronological age, (b) type of residence, (c) client characteristic, (d) consumer level of mental retardation, and (e) consumer levels of adaptive and maladaptive behavior. When estimating effects of the preceding variables (a) through (e), we estimated the variance explained by a given predictor while partialing variables earlier in the list. Thus, we first estimated the effect of consumer age, then we estimated the influence of the type of residence (while partialing consumer age), next we estimated the effect of client characteristic (while partialing both consumer age and type of residence), and so forth, ending with our estimating of the influence of consumer levels of adaptive and maladaptive behaviors (while partialing consumer age, type of residence, client characteristic, and consumer level of mental retardation).

After estimating the effects of the preceding, legitimate cost-related variables, we then added the potential bias factors of (f) regional center, (g) consumer ethnic status, and (h) consumer gender, partialing all factors out of these bias factors. We could find no rationale for ordering the estimation of effects of these variables, so the effects of these bias factors were fully controlled, a conservative approach to estimating the magnitude of the effects of these factors

that might represent bias in distribution of services.

As discussed below, we estimated variance explained by the preceding factors after partialing effects of other factors as we just described. But, after partialing to get estimates of variance explained, we obtained the estimated means on all factors – both the legitimate cost-related factors and the potential bias factors – while partialing all other factors. As a result, estimates of the costs for clients in different age groups were estimated while partialing all other factors in the analysis, and this approach was taken for all predictor variables.

### **Alternative Treatments of the Dependent Variable, POS**

Because the purchase of service outcome variables were positively skewed, we performed all analyses on four different ways of scoring the outcome variables. The first set of analyses was performed on raw purchase of service values, the typical way in which these data have been analyzed in the past. The positive skew of raw cost values means that a large number of persons have a relatively low level of purchase of services in a given category, and a relatively small number of persons have relatively high levels of purchase of services. This skew can lead to anomalous findings, as the mean (or average) of a set of numbers is heavily influenced by skewness of the set of scores.

To decrease the degree of positive skew, we also performed all analyses on three transformed versions of the purchase of service values. The first of these transformations was to take the logarithm (to the base 10) of purchase of service values (after adding the value 1, as the logarithm of 0 is undefined (i.e., negative infinity). The second transformation was to trim, or delete, the largest 1% of values within each cost category. Trimming extreme values is a common method for dealing with skewed distributions, leading to much better defined estimates of the mean. Trimming 1% of the values is a conservative approach, as the trimming of 5% to 10% of extreme values is often performed. The third transformation is known as Winsorizing. Under Winsorizing, one truncates a given percentage of values so that they do not fall above a certain value. We Winsorized the top 1% of values, by recoding these values equal to the value at the 99<sup>th</sup> percentile. Thus, instead of discarding outliers, the outliers are retained but forced to fall at a rather large, but not strictly unusual value. As with trimming, Winsorizing 1% of the values was a conservative approach, as researchers often Winsorize a larger percentage of cases.

### **Characterizing Differences: Statistical and Practical Significance**

Statistical significance. The first and usual way to characterize differences as a function of a predictor variable is to evaluate the statistical significance of the difference. Statistical significance answers the question regarding whether the observed differences between groups (or the estimated regression coefficient) could have occurred by chance alone. When analyzing data, two means are never precisely equal, even if there is no true difference in the population means for the two groups. Given this, statistical significance allows one to conclude that a mean difference is larger than one would expect on the basis of chance alone. For the current study, because sample size was large (over 110,000 per fiscal year) and because of the large number of significance tests computed, we used the  $\alpha = .001$  level to evaluate statistical significance. But,

even using such a conservative level of significance, virtually all significance tests computed fell in the significant range.

We had complete data on the following numbers of consumers:

Fiscal year 1995-96	111,762 consumers
Fiscal year 1996-97	118,598 consumers
Fiscal year 1997-98	123,364 consumers
Fiscal year 1998-99	129,615 consumers
Fiscal year 1999-2000	135,726 consumers

We therefore had extremely high levels of power to determine that effects were statistically significant. The numbers of consumers with complete data for each fiscal year listed above represented about 85% of the total number of consumers on the official DDS roles. But, a series of analyses demonstrated that the 15% of consumers excluded due to missing data were not substantially different from the 85% retained for analyses on any variables of interest. As a result, the consumers on whom analyses were performed were a clear majority of the persons served by DDS each year and were representative of the population of consumers.

Practical significance: Variance explained. When sample size is large, statistical significance of comparisons is virtually assured. In such situations, even effects of trivial magnitude are often significant. Because of this, researchers have often relied on measures of practical significance (or importance) when evaluating the magnitude of effects. The first and most common index of practical significance is variance in an outcome variable explained by a predictor. Cohen (1988) offered criteria for magnitude of effects based on variance explained, stating that explaining 25% or more of the variance constituted a large effect, explaining around 10% was a moderate effect, and explaining approximately 1% of the variance constituted a small effect. In the current report, we report variance explained to four decimal places and interpret these figures, but we present all variance explained values so that readers can determine for themselves how large various effects are.

As noted above, the eight sets of predictor variables had different numbers of pseudovariates or linear main effects needed to characterize differences among groups. The number of pseudovariates were as follows: (a) regional center had 20, (b) gender had 1, (c) ethnicity had 8, (d) age group had 4, (e) residence type had 5, (f) client characteristic had 8, and (g) level of mental retardation had 5. In addition, consumer levels of adaptive and maladaptive behavior were associated with 6 regression weights. Our reason for stressing these differences in number of parameter estimates is this: the larger the number of parameter estimates associated with an effect, the greater the chance that the factor will explain a larger percentage of variance. For example, gender is associated with only a single parameter estimate (the difference between males and females), so cannot explain much variance. But, regional center has 20 parameter estimates, leading to greater likelihood of explaining variance. One way to control for differences in number of parameter estimates is to look at “explained variance per degree of freedom,” and we will do this in several analyses.

Practical significance: The Cohen's  $d$  metric. A second way of indexing the magnitude of effects is to use the  $d$  statistic proposed by Cohen (1988). Cohen's  $d$  is calculated, simply, as the difference between two means divided by the residual SD of the variable. For example, if the means for two groups are 500 and 1,000 and the residual SD of the variable is 2,000, this would lead to a Cohen's  $d$  value of  $(1000 - 500)/2000 = 0.25$ , indicating that the mean difference between the groups is one-fourth the size of the residual SD. Cohen argued that a  $d$  value of 0.80 indicated a large effect, a value of 0.50 reflected a medium or moderate sized effect, and a value of 0.20 represented a small effect. We used these baseline values for indicating the magnitude of effects in our analyses to characterize how large the differences were between groups in their mean levels of expenditure.

## IV. VARIANCE IN SERVICE EXPENDITURES

With a report such as the present one in which a large number of analyses are presented and summarized, one must beware of losing awareness of the core trends in the data as the various analyses are discussed. To guard against this possibility, we will discuss in detail the results of analyses of the various forms of the cost dependent variable only for the first year for which we have data (Fiscal Year 1995-1996). After portraying the somewhat different pictures of patterns of expenditure yielded by the various analyses for the first year, we will concentrate on only a single form of the cost dependent variable for the remaining years. Still, the results of all analyses for all years are contained in a series of appendices, so that interested readers can see the results based on different treatments of the outcome variables.

### A. FISCAL YEAR 1995-1996

Raw cost value analyses. The first set of analyses for data from Fiscal Year 1995-1996 used raw cost data as the dependent variable. In Table IV.A.1, we show the proportion of variance in each of the nine cost categories explained by each of the independent variables (a) when each independent variable is considered separately (i.e., not partialing any other variables; see top half of table), and (b) when other independent variables are controlled from each independent variable (see bottom half of table). For example, type of residence explained over 40% of the variance of out-of-home expenses when considered alone (.4032), but a smaller, but still substantial 37% of the variance (.3698) over and above the effect of age group. The bottom line in the bottom half of the table, labeled “Multiple R<sup>2</sup>,” lists the overall proportion of variance explained by the best weighted combination of the predictor variables.

One trend to note in Table IV.A.1 is that a considerable percentage of the variance (i.e., between 23 and 44%) in four cost categories – out of home, day programs, transportation, and POS Total – was explained by the eight predictors. In the remaining five cost categories, more modest percentages of variance were explained (i.e., between 2 and 7%). This means that, in these latter categories, purchase of services – to the degree that service provision was related to systematic factors – was not well explained by the predictor variables to which we had access.

A second trend in values reported in Table IV.A.1 is the considerable reduction in variance explained by bias factors, in almost every case, when other factors are controlled statistically. For example, ethnic status explained almost 1.5% of the variance of out of home expenses when other factors were not controlled (.0145), but this was reduced to about one-twentieth of 1% of the variance (or .0006) when other factors were controlled. A similar reduction in explained variance occurred for day program expenses, where the variance explained by ethnic status was reduced from over 2% of the variance (or .0203) to one-twentieth of 1% of the variance (or .0005) when other variables were controlled.

**Table IV.A.1**

Year 1995-1996, Raw Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0055	.0084	.1357	.0062	.0087	.0059	.0059	.0075	.0094
Gender	.0006	.0002	.0000	.0000	.0000	.0002	.0000	.0000	.0001
Ethnicity	.0145	.0203	.0082	.0006	.0012	.0007	.0026	.0015	.0279
Age Group	.0378	.1688	.0638	.0025	.0185	.0044	.0016	.0017	.0965
Residence	.4032	.1433	.0429	.0005	.0183	.0022	.0109	.0162	.2308
Client Characteristic	.0632	.0891	.0316	.0103	.0342	.0033	.0082	.0049	.0974
Mental Retardation	.0281	.0741	.0289	.0036	.0094	.0011	.0022	.0004	.0620
Adaptive Behaviors	.0580	.0173	.0068	.0133	.0413	.0051	.0119	.0065	.0559
Other Independent Variables Controlled									
Regional Center	.0003	.0094	.1203	.0059	.0082	.0054	.0045	.0059	.0066
Gender	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Ethnicity	.0006	.0005	.0010	.0004	.0028	.0014	.0003	.0002	.0012
Age Group	.0378	.1688	.0638	.0024	.0185	.0044	.0016	.0017	.0965
Residence	.3698	.0623	.0281	.0002	.0064	.0005	.0116	.0149	.1598
Client Characteristic	.0188	.0332	.0059	.0092	.0286	.0023	.0073	.0099	.0546
Mental Retardation	.0008	.0100	.0038	.0014	.0016	.0006	.0005	.0004	.0061
Adaptive Behaviors	.0071	.0110	.0038	.0028	.0117	.0033	.0043	.0040	.0189
Multiple R <sup>2</sup>	.4379	.2951	.2328	.0224	.0786	.0178	.0304	.0371	.3436

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

In addition to variance explained, we can look at the mean differences for groups before other variables are controlled as well as after other independent variables are partialled out, or

controlled statistically. For example, consider the values in Table IV.A.2, which contains mean expenditures for persons from each ethnic group in each of the nine cost categories – and note that these means were computed without controlling for other predictor variables.

**Table IV.A.2**

Year 1995-1996, Raw Cost Values – Average Per Client Service Expenditures by Ethnicity:  
(a) Other Independent Variables Not Controlled

Ethnicity	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Asian	945	1407	141	70	281	80	216	156	3295
Black	1265	1969	379	82	254	85	251	176	4462
Filipino	981	1724	194	105	410	78	241	213	3945
Hispanic	888	1395	183	93	334	50	180	134	3257
Native American	1359	2149	138	66	219	34	312	293	4570
Other	1159	1281	103	186	544	121	327	251	3972
Polynesian	740	1821	180	83	448	56	180	339	3847
Unknown	848	1295	66	190	413	61	366	220	3458
White	2104	2744	233	125	355	93	398	378	6430
Mean	1561	2138	221	114	347	81	312	272	5047
Residual SD	3487	3748	653	1114	1650	755	1845	2823	6986

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

We can examine costs within each of the nine service categories, but here we will stress the POS Total variable, which reflects total purchase of services for individuals in the different ethnic categories. Replicating results from the first POS study report in April 1999, we see large differences across ethnic groups, from a high of \$ 6,430 for White consumers to a low of \$ 3,257 for Hispanic consumers. Not only is this an approximate 2:1 ratio of spending between these two groups, but the magnitude of the mean difference is a Cohen's *d* of approximately 0.45 [obtained as  $(6430 - 3257) / 6986 = 0.45$ ], which is a moderate-sized effect. To the extent that this is an accurate estimate, this suggests bias in the service delivery system in favor of White consumers and against Hispanic consumers.

But, the mean differences reported in Table IV.A.2 did not have other predictors – such as consumer age – controlled statistically. When other predictors are controlled statistically, we get the values shown in Table IV.A.3. As shown in this table, the mean estimates of expenditures are greatly altered when other predictors are controlled. White consumers still had the highest level of POS Total service expenditures (\$ 5,130), but Hispanic consumers received only about \$ 600 less than White consumers, rather than about \$ 3,200 less. Furthermore, the difference between mean expenditures for White and Hispanic consumers leads to a Cohen’s *d* of only 0.08, a relatively small effect. The largest difference in between groups on adjusted means was now between White and Asian consumers, a difference of about \$ 900 per year, associated with a Cohen’s *d* of about 0.13, once again a fairly small difference.

**Table IV.A.3**

Year 1995-1996, Raw Cost Values, Average Per Client Service Expenditures by Ethnicity:  
(b) Other Independent Variables Controlled

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Asian	1747	1815	111	35	-283	14	536	245	4220
Black	1360	2141	166	56	-132	34	550	212	4388
Filipino	1770	2024	146	77	-148	10	577	239	4695
Hispanic	1775	2077	87	56	-247	-7	535	234	4509
Native American	1444	2179	117	47	-222	14	514	265	4359
Other	1755	2099	126	115	-78	45	588	258	4910
Polynesian	1545	2155	108	46	-117	15	495	361	4609
Unknown	1699	2277	119	91	-175	11	597	236	4854
White	1678	2248	135	100	-23	68	608	316	5130
Mean	1642	2113	124	69	-158	23	556	263	4630
Residual SD	3487	3748	653	1114	1650	755	1845	2823	6986

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

Log transformed cost values. The complete set of tables based on raw expenditure values is contained in Appendix B, pages B-2 through B-17. But, we will not discuss these analyses in any great detail because the results of all statistical analyses – both the variance explained values and the means before and after controlling other factors statistically – are biased due to the

presence of outlier values. To illustrate the effect on results when using transformed values of the dependent variables, consider first Table IV.A.4, which lists the variance explained values when analyzing the log of cost values. In Table IV.A.4, residence type explains much more variance in out of home costs than was the case for raw cost values (compare the controlled value of .6585 in Table IV.A.4 with the value of .3690 from Table IV.A.1). In terms of overall variance explained (see last line in bottom half of Table IV.A.4), when log values were analyzed, more variance was explained in eight of the nine cost categories relative to the raw value analyses reported in Table IV.A.1. Surprisingly, the only outcome variable having a lower level of variance explained in the analysis of log values was the POS Total summary variable. [The complete set of tables for analyses of log transformed values are contained in Appendix B, pages B-18 through B-33).

On the basis of Tables IV.A.1 and IV.A.4, comparisons across tables suggests that the analyses of log values would be preferred over the analysis of raw scores, because a greater percentage of variance was explained with log values were analyzed than when raw score values were analyzed. However, when analyzing log values, the metric of the outcome variable is lost. This is shown in the top half of Table IV.A.5, which gives the mean log of expenditures in different cost categories as a function of ethnic status prior to controlling other factors statistically. With regard to the POS Total variable, the largest difference between ethnic groups is between White and Asian consumers, a mean difference associated with a Cohen's *d* of 0.64, a moderate-to-large effect that once again favors White consumers over a minority ethnic group, in this instance Asian consumers.

But, when other predictors are controlled statistically, we have the values reported in the bottom half of Table IV.A.5. For the POS Total variable, the largest difference between ethnic groups is once again for the White and Asian consumer groups. But, the adjusted means for these two groups lead to a Cohen's *d* value of 0.31, a value that is less than half as large as that obtained when other predictors were not controlled statistically. Although the magnitude of bias in delivery of services was considerably reduced by controlling other predictors when analyzing log transformed cost values, the magnitude of the effect was still moderate in size. But, this analysis is based on the way in which log transformed values of cost vary with predictors, such as ethnic status. Looking at values in the bottom half of Table IV.A.5, interpreting the magnitude of the difference between Whites and Asians is very difficult. For example, just how large – in terms of difference in service costs – is the obtained difference between a mean log value of 2.56 for White consumers and the mean log value of 2.13 for Asian consumers?

**Table IV.A.4**

Year 1995-1996, Log Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

	Service Category								
Independent Variable	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0088	.0083	.1283	.0516	.0149	.0100	.0314	.0277	.0096
Gender	.0000	.0011	.0001	.0001	.0003	.0001	.0002	.0008	.0001
Ethnicity	.0400	.0254	.0094	.0028	.0062	.0022	.0102	.0018	.0443
Age Group	.1147	.2461	.1030	.0202	.1169	.0068	.0084	.0071	.1106
Residence	.7664	.1617	.0608	.0034	.0968	.0065	.2086	.0199	.1980
Client Characteristic	.0898	.1119	.0495	.0288	.1019	.0058	.0114	.0162	.0713
Mental Retardation	.0484	.0637	.0278	.0071	.0259	.0019	.0111	.0071	.0469
Adaptive Behaviors	.0471	.0168	.0107	.0372	.0992	.0102	.0405	.0237	.0381
Other Independent Variables Controlled									
Regional Center	.0006	.0095	.1194	.0519	.0140	.0087	.0181	.0257	.0085
Gender	.0000	.0001	.0000	.0000	.0001	.0000	.0000	.0001	.0000
Ethnicity	.0010	.0007	.0004	.0010	.0042	.0034	.0007	.0008	.0064
Age Group	.1147	.2461	.1030	.0202	.1169	.0068	.0084	.0071	.1106
Residence	.6585	.0517	.0284	.0015	.0289	.0027	.2063	.0217	.1201
Client Characteristic	.0021	.0241	.0035	.0173	.0362	.0043	.0071	.0127	.0354
Mental Retardation	.0005	.0094	.0022	.0009	.0046	.0012	.0004	.0004	.0073
Adaptive Behaviors	.0012	.0066	.0024	.0097	.0196	.0067	.0074	.0472	.0222
Multiple R <sup>2</sup>	.7787	.3481	.2624	.1030	.2262	.0347	.2496	.0868	.3104

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.A.5**

Year 1995-1996, Log Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	0.40	0.72	0.29	0.22	0.54	0.11	0.44	0.15	1.89
Black	0.56	1.04	0.60	0.31	0.43	0.12	0.47	0.20	2.22
Filipino	0.36	0.91	0.37	0.28	0.60	0.11	0.40	0.19	2.09
Hispanic	0.36	0.77	0.37	0.34	0.62	0.07	0.47	0.19	2.02
Native American	0.73	1.09	0.34	0.23	0.39	0.09	0.78	0.20	2.38
Other	0.42	0.69	0.25	0.35	0.79	0.16	0.57	0.28	2.22
Polynesian	0.35	0.96	0.36	0.33	0.52	0.13	0.38	0.20	1.97
Unknown	0.31	0.71	0.20	0.56	0.76	0.11	0.64	0.34	2.26
White	1.00	1.33	0.52	0.29	0.49	0.13	0.70	0.24	2.78
Mean	0.71	1.08	0.46	0.31	0.54	0.11	0.59	0.22	2.44
Residual SD	0.70	1.37	0.93	0.78	1.04	0.57	1.00	0.77	1.40
Other Independent Variables Controlled									
Asian	0.65	1.03	0.30	0.18	-0.01	0.02	0.97	0.13	2.13
Black	0.51	1.22	0.36	0.19	0.10	0.06	0.95	0.16	2.30
Filipino	0.64	1.15	0.36	0.24	0.09	0.02	0.95	0.16	2.32
Hispanic	0.64	1.18	0.30	0.21	0.03	-0.01	0.98	0.16	2.25
Native American	0.64	1.20	0.27	0.13	0.02	0.04	1.02	0.16	2.31
Other	0.64	1.18	0.34	0.24	0.16	0.06	1.02	0.22	2.44
Polynesian	0.64	1.23	0.29	0.22	0.02	0.07	0.85	0.16	2.18
Unknown	0.61	1.21	0.32	0.38	0.11	0.03	1.00	0.24	2.44
White	0.68	1.24	0.35	0.24	0.22	0.08	1.03	0.21	2.56
Mean	0.63	1.18	0.32	0.22	0.08	0.04	0.97	0.18	2.33
Residual SD	0.70	1.37	0.93	0.78	1.04	0.57	1.00	0.77	1.40

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

Trimmed cost values. One way around this problem is to use the remaining two transformations of the raw cost values, transformations that retain the easily interpretable metric of the outcome variables (in dollars), yet decrease the impact of outliers on the estimates of explained variance and mean values. The first of these remaining transformations is the use of trimmed cost values.

The differences arising from the use of trimmed cost values is illustrated in Table IV.A.6, which gives the variance explained by predictors. Values in this table can be compared with those in Table IV.A.1, which were based on analyses of raw cost values. Comparisons across tables show that the values in Table IV.A.6 tend to be about 10 percent larger than those in Table IV.A.1, suggesting that trimming the outlier cost values enabled the predictors to explain more variance in service costs. In turn, this implies that the large positive outlier cost values represent unpredictable variation that is the result of non-systematic factors of the individual consumer, rather than systematic effects of legitimate or biasing factors.

Once again, the potential bias factors of regional center and ethnic status explained non-trivial percentages of variance prior to the controlling of other variables. However, after controlling for other variables, these factors – particularly ethnic status – explained extremely small portions of variance after other predictors were controlled. For example, after controlling for other factors, ethnic status explained less than two-tenths of one percent of the variance of each cost variable for all cost variables except for in-home respite.

Differences among ethnic groups in means of the trimmed data are shown in Table IV.A.7, with means prior to partialling or controlling other independent variables shown in the top half of the table and means controlling for other independent variable shown in the bottom half of the table. In the top half of the table, expenditures varied widely across ethnic groups, with a Cohen's *d* value over 0.50 for the difference between the groups with the highest (White consumers) and lowest (Asian consumers) mean expenditures. However, as shown in the bottom half of the table, when other independent variables were controlled statistically, the differences between ethnic groups were reduced greatly. Specifically, after controlling other independent variables, the largest difference between ethnic groups was associated with a Cohen's *d* value of about 0.15, a relatively small effect. Moreover, the average expenditures for almost all ethnic groups fell within \$ 250 per year of the mean expenditures across all ethnic groups, which was about \$ 4,200 per year, corresponding to Cohen's *d* values less than 0.05. The complete set of tables reporting results of analyses of the trimmed data are contained in Appendix B, pages B-34 through B-49.

**Table IV.A.6**

Year 1995-1996, 1% Trimmed Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0041	.0075	.1408	.0075	.0126	.0080	.0091	.0083	.0076
Gender	.0004	.0004	.0000	.0000	.0001	.0002	.0000	.0000	.0000
Ethnicity	.0152	.0214	.0082	.0006	.0017	.0009	.0030	.0015	.0315
Age Group	.0398	.1849	.0655	.0045	.0318	.0055	.0027	.0012	.1194
Residence	.4301	.1583	.0438	.0008	.0282	.0028	.0153	.0159	.2907
Client Characteristic	.0565	.0983	.0329	.0143	.0473	.0043	.0070	.0015	.1087
Mental Retardation	.0287	.0839	.0296	.0048	.0133	.0015	.0029	.0011	.0790
Adaptive Behaviors	.0476	.0148	.0072	.0179	.0563	.0069	.0113	.0054	.0480
Other Independent Variables Controlled									
Regional Center	.0022	.0091	.1249	.0071	.0122	.0072	.0075	.0070	.0064
Gender	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Ethnicity	.0007	.0005	.0005	.0004	.0036	.0017	.0004	.0004	.0014
Age Group	.0398	.1849	.0655	.0045	.0318	.0055	.0027	.0012	.1194
Residence	.3938	.0742	.0292	.0002	.0091	.0007	.0168	.0150	.2044
Client Characteristic	.0134	.0316	.0059	.0118	.0356	.0029	.0054	.0026	.0455
Mental Retardation	.0009	.0110	.0040	.0016	.0025	.0009	.0005	.0001	.0079
Adaptive Behaviors	.0056	.0104	.0038	.0034	.0147	.0043	.0037	.0039	.0169
Multiple R <sup>2</sup>	.4566	.3217	.2407	.0293	.1106	.0232	.0375	.0302	.4016

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.A.7**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	843	1346	138	70	282	80	183	82	3024
Black	1094	1850	371	76	255	85	208	122	4060
Filipino	887	1631	193	106	412	78	169	123	3598
Hispanic	809	1349	181	90	324	50	162	99	3064
Native American	1235	2104	135	67	221	34	312	137	4243
Other	1008	1179	102	152	520	122	296	175	3556
Polynesian	744	1827	180	83	450	56	180	52	3573
Unknown	638	1199	63	190	416	62	341	142	3050
White	1881	2588	227	108	329	89	319	207	5748
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
Asian	1543	1741	111	33	-213	20	468	86	3789
Black	1167	2079	165	48	-78	39	477	98	3996
Filipino	1612	1931	148	76	-76	16	465	105	4277
Hispanic	1558	1995	87	49	-184	-3	468	107	4077
Native American	1263	2146	116	43	-166	19	494	106	4021
Other	1539	1998	129	85	-34	52	536	150	4456
Polynesian	1440	2161	110	45	-40	20	464	31	4230
Unknown	1390	2153	118	96	-120	15	551	107	4310
White	1476	2147	134	83	14	68	529	156	4608
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

Winsorized cost values. Analyses were also conducted on Winsorized cost values. These analyses proved to be less successful than analyses of trimmed data, primarily because of larger residual SD values. The variance explained for Winsorized data and trimmed data were fairly comparable; explained variances for uncontrolled and controlled predictors based on Winsorized data are shown in Table IV.A.8, and these can be compared to values in Table IV.A.6.

However, inspection of the tables in Appendix B, pages B-50 through B65, will reveal that the residual SD values for the Winsorized data were considerably larger than those for the trimmed data. Smaller residual SD values are preferred because they yield more powerful and larger estimates of the Cohen's *d* values used when evaluating differences among groups. As a result, the trimmed data appeared to be the most useful and powerful way to transform cost values in the current study, and all remaining discussion of results will focus on the results of analyses of trimmed data. But, results of analyses of all four forms of the outcome variables – raw cost scores, log transformed, trimmed, and Winsorized – are shown in Appendix B so that interested readers can compare results across these four forms of the cost variables.

**Table IV.A.8**

Year 1995-1996, 1% Winsorized Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0054	.0083	.1478	.0172	.0179	.0098	.0152	.0164	.0096
Gender	.0006	.0003	.0000	.0000	.0002	.0001	.0000	.0001	.0001
Ethnicity	.0158	.0231	.0083	.0023	.0029	.0013	.0052	.0024	.0312
Age Group	.0422	.1972	.0734	.0165	.0566	.0082	.0042	.0026	.1115
Residence	.4323	.1723	.0530	.0026	.0497	.0057	.0286	.0299	.2717
Client Characteristic	.0656	.1057	.0371	.0279	.0686	.0063	.0114	.0050	.1093
Mental Retardation	.0305	.0917	.0333	.0083	.0191	.0019	.0038	.0020	.0717
Adaptive Behaviors	.0590	.0199	.0083	.0364	.0787	.0097	.0202	.0118	.0592
Other Independent Variables Controlled									
Regional Center	.0027	.0093	.1315	.0173	.0174	.0089	.0114	.0143	.0069
Gender	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Ethnicity	.0006	.0005	.0005	.0008	.0042	.0006	.0006	.0005	.0013
Age Group	.0422	.1972	.0734	.0165	.0566	.0082	.0042	.0026	.1115
Residence	.3944	.0807	.0344	.0001	.0157	.0016	.0298	.0280	.1899
Client Characteristic	.0183	.0353	.0063	.0179	.0436	.0040	.0108	.0083	.0553
Mental Retardation	.0009	.0121	.0043	.0016	.0039	.0010	.0008	.0002	.0068
Adaptive Behaviors	.0074	.0113	.0041	.0087	.0198	.0057	.0074	.0073	.0191
Multiple R <sup>2</sup>	.4662	.3464	.2609	.0636	.1624	.0323	.0658	.0612	.3905

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

Cost variations associated with legitimate cost-related variables. In foregoing pages, we presented analyses for the four forms of the outcome variable and argued that the trimmed data provided the clearest picture of expenditures and the most powerful way of characterizing differences among groups. In addition, we discussed in some detail the nature of differential expenditures for consumers in different ethnic groups. The analyses showed initial, substantial differences among ethnic groups in mean expenditures when other independent variables were not controlled, but relatively small differences among ethnic groups once other independent variables were controlled statistically. Here, we will describe the differences in mean expenditures as a function of other independent variables, both prior to and after controlling for other independent variables.

First, consider the differences in expenditure patterns as a function of chronological age, shown in Table IV.A.9. As shown in the top half of the table, mean expenditures for adults were approximately 2 to 4 times higher than for children and adolescents, and service expenditures for infants fell between these two extremes. The Cohen's  $d$  value for the difference between the groups with the highest and lowest average expenditures was quite large, approximately 1.0. After controlling statistically for the other independent variables, the results shown in the bottom of Table IV.A.9 were obtained. Recall that controlling for other independent variables largely eliminated initial differences in expenditures as a function of ethnic status. But, here, for consumer age, the results in the bottom of this table show almost the same differential levels of expenditures as shown for the uncontrolled results in the top half of the table. Indeed, the Cohen's  $d$  for the difference between the groups with the highest and lowest levels of expenditures was 0.90, still a  $d$  value of large magnitude. So, controlling for other independent variables had little effect on the estimated mean expenditures as a function of consumer age.

A similar pattern of results held for expenditures for consumers residing in different settings, results shown in Table IV.A.10. In the top half of the table, means were not controlled for other independent variables. Clearly, service expenditures vary greatly for consumers in different types of residence, driven largely by differential patterns of expenditures for out of home services and day programs. The Cohen's  $d$  for the difference between the groups with the highest and lowest costs on the POS Total variable was very large, approximately 1.82. After controlling for other independent variables, the resulting means are shown in the bottom half of the table. If anything, controlling for other independent variables exacerbated the differences among the groups. The Cohen's  $d$  for the largest mean contrast increased to over 2.2.

The patterns of results for the client characteristic variable fell between the two extremes, with moderate changes in mean differences after partialling other independent variables, as shown in Table IV.A.11. In the uncontrolled data shown in the top half of the table, substantial differences among groups are evident, again driven primarily by costs in the out of home and day program categories of expenditure. On the POS Total variable, the difference between the groups with the highest and lowest levels of expenditures had a Cohen's  $d$  of about 1.8. But, a good deal of the group differences were eliminated after other independent variables were controlled statistically. This reduction was shown by the much lower Cohen's  $d$  of about 0.50 for the largest differences in mean expenditures across groups.

**Table IV.A.9**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Age Group

Age Group	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
00-02 years	75	1864	55	418	582	66	839	110	4009
03-11 years	227	126	18	173	664	113	235	135	1691
12-22 years	1209	330	38	91	433	144	217	106	2567
23-44 years	1908	3779	401	65	130	29	290	214	6816
45+ years	2596	3543	387	59	64	49	232	148	7079
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
00-02 years	1343	2431	24	73	-517	2	924	27	4308
03-11 years	1115	68	-74	88	62	26	399	64	1747
12-22 years	1727	530	-17	46	47	86	410	112	2941
23-44 years	1739	3873	365	55	-60	-6	410	181	6558
45+ years	1292	3293	323	48	-30	28	330	141	5426
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

**Table IV.A.10**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Residence

Residence	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
CCF	6877	3842	470	60	20	42	219	88	11619
Home of parent	62	1003	136	118	496	105	181	117	2218
ICF	333	6791	524	107	40	23	626	95	8540
Independent Living	141	2927	105	75	50	22	651	674	4644
Other	640	474	59	87	50	26	421	116	1873
SNF	273	1524	105	96	19	31	254	61	2364
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
CCF	6963	3095	325	96	-23	18	368	24	10866
Home of Parent	394	2006	199	122	439	98	324	94	3677
ICF	76	5046	308	42	-401	-12	697	-27	5729
Independent Living	646	3005	74	106	247	82	833	667	5660
Other	39	-1123	-93	52	-391	-26	424	-43	-1161
SNF	541	206	-68	-46	-469	3	323	-85	405
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

**Table IV.A.11**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Client Characteristic

Client Characteristic	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Autism	2104	1804	185	107	491	205	443	319	5657
Behavior Adjustment	4809	4351	333	111	400	134	565	192	10894
Child Development	227	119	15	98	487	103	176	101	1326
Habilitation	1378	2008	238	38	70	40	207	169	4147
Medical	1316	2187	226	156	842	76	484	184	5471
Physical Development	526	1838	151	383	967	91	425	191	4572
Physical-Social Dev.	2308	4193	412	154	441	83	315	124	8031
Sensory	2279	3555	359	66	268	64	273	139	7002
Social Development	2539	4133	449	74	221	95	203	130	7842
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
Autism	1898	2114	86	46	-126	85	640	250	4993
Behavior Adjustment	2495	2381	120	103	-140	-14	610	29	5583
Child Development	1203	1751	118	-10	-229	6	422	90	3350
Habilitation	974	1402	101	45	-172	28	445	91	2913
Medical	1371	1791	95	41	200	28	578	136	4239
Physical Development	1253	2258	150	116	-76	38	422	111	4274
Physical-Social Dev.	1354	2026	141	101	-105	16	432	63	4028
Sensory	1356	2199	135	46	-113	18	463	82	4186
Social Development	1083	2430	173	70	-136	41	440	94	4196
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

Finally, the mean service expenditures for persons having different levels of mental retardation are shown in Table IV.A.12. As expected, consumers having severe or profound mental retardation have higher levels of service expenditures than consumers having other levels of mental retardation. The contrast between the groups with the highest and lowest levels of expenditures based on the uncontrolled data (shown in the top half of the table) had a Cohen's *d* of about 1.10, a very large difference. But, after other independent variables were controlled, the adjusted mean expenditures among groups are shown in the bottom half of the table. The differences in mean expenditures across groups were largely eliminated, as the difference between the groups with highest and lowest mean expenditures was associated with a Cohen's *d* value of only about 0.30. This is still a moderate-sized and non-negligible effect, but was much smaller than the effect prior to controlling other independent variables.

**Table IV.A.12**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Level of Mental Retardation

Level of Mental Retardation	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
No retardation	539	970	69	183	430	82	352	241	2865
Mild	1073	1442	157	62	184	58	223	175	3376
Moderate	1821	2214	289	62	292	95	192	115	5079
Severe	2636	3813	399	105	474	97	230	127	7880
Profound	2304	4784	451	134	465	54	397	113	8703
Unspecified	483	682	49	246	712	150	353	154	2830
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
No retardation	1233	1645	112	120	-129	2	516	109	3609
Mild	1273	1621	82	72	-153	18	497	120	3529
Moderate	1388	1760	128	60	-70	45	513	124	3948
Severe	1607	2498	152	44	-14	33	474	109	4902
Profound	1711	2841	153	-19	-130	11	468	60	5096
Unspecified	1446	1870	118	94	-101	55	501	109	4092
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

Cost variations associated with potential biasing variables. The variations in costs associated with the three potential biasing variables should also be considered. These three potential biasing factors are effects of regional center, consumer gender, and consumer ethnicity.

With regard to effects of regional center, the mean expenditures without controlling other independent variables are shown in Table IV.A.13 and mean expenditures after controlling other independent variables are shown in Table IV.A.14. Prior to controlling other independent variables, the difference between the highest-spending and lowest-spending regional centers (North Bay and Inland, respectively) was just over \$ 2,500, corresponding to a Cohen's *d* of almost 0.50, a moderate-sized effect. After controlling for other independent variables, the gap between the highest and lowest spending regional centers (now, Westside and Inland, respectively) was still about \$ 2,500, so still was a moderate-sized effect. Most of the variation across regional centers appears to occur on the first three cost categories – Out of Home, Day Programs, and Transportation. The first two of these categories – Out of Home and Day Programs – are categories that are responsible for the majority of funds expended on consumers; variations across regional centers, even on the adjusted means shown in Table IV.A.13, often shown an approximate 2:1 ratio between average client expenditures for the highest spending centers versus the lowest spending centers. Moreover, on the third category – Transportation – two regional centers had very high levels of spending in this category, dwarfing dollar amounts spent on transportation by most other centers. The nature of these regional center differences in spending patterns for services will be a continuing concern in the POS II study.

Turning the variable of consumer gender, both the uncontrolled and the controlled (or adjusted) means shown in Table IV.A.15 demonstrate that male and female consumers served by the regional centers receive very similar dollar amounts of service in each of the nine cost categories, at least as indexed by the average expenditures. As a result, there is essentially no evidence of any effect of consumer gender on spending patterns.

Finally, we repeat in Table IV.A.16 the mean expenditures for consumers as a function of consumer ethnic status (Table IV.A.16 is a simple repeating of information contained in Table IV.A.7). As noted earlier, the uncontrolled means (shown in the top half of Table IV.A.16) appear to show that White consumers receive services that cost approximately twice the dollar amount spent on services for Asian and Hispanic consumers. Not only are these differences in dollar amounts apparently rather large, but they correspond to a Cohen's *d* of over 0.50, a fairly large effect. But, these uncontrolled means fail to take account of differences in the populations of Asian, Hispanic, and White consumers. That is, the populations of Asian, Hispanic, and White consumers differ on many dimensions, including age and place of residence. When these differences are controlled statistically, the resulting adjusted means are shown in the bottom half of Table IV.A.16. There, we find that the adjusted means show at most a Cohen's *d* of about 0.15 between the groups with the highest and lowest mean expenditures, a much reduced difference between groups and a fairly small effect. Despite the characterization of the over \$ 800 per year difference in expenditures for the White and Asian groups as a small effect, some might characterize this as a notable finding. In the remainder of this report, we will continue to monitor differences in mean expenditures for consumers from different ethnic groups to track the

consistency of the spending differences for persons with differing ethnic status.

Summary. Certain consumer characteristics – primarily consumer age and place of residence – have strong and consistent effects on mean expenditures, regardless of whether other independent variables are controlled statistically. Other characteristics – including the variable termed “client characteristic” and consumer level of mental retardation – had rather large effects on mean expenditures only when other independent variables were not controlled. After controlling for other independent variables, these factors still showed notable differences among groups, but at greatly attenuated levels. Finally, the potentially biasing factors of consumer gender and ethnic group were associated with relatively small differences among groups, particularly when other independent variables were controlled statistically. As a result, expenditure patterns during the 1995-96 fiscal year seem driven primarily by the age of the consumer and his or her residence, which dictate clear and substantial service needs for certain consumers and not for others – as a function of the consumer’s age and residence. Differences in mean expenditures for consumers from different ethnic groups were largely artifactual, due to the differential age and residential placements for consumers from the different ethnic groups.

**Table IV.A.13**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (a) Other Independent Variables Not Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	1332	1896	79	155	414	48	327	160	4413
Central Valley	1348	1736	45	96	274	15	265	84	3862
East Bay	1427	1876	48	259	300	132	477	155	4672
East Los Angeles	1090	2057	93	71	430	100	217	144	4202
Far Northern	1426	1679	52	165	267	41	577	277	4484
Golden Gate	1636	2789	130	28	263	39	186	108	5179
Harbor	1017	1670	189	177	161	21	234	388	3858
Inland	1136	1608	255	49	221	5	109	77	3461
Kern	1340	1914	71	144	221	43	438	365	4535
Lanterman	1702	1652	452	133	319	142	219	92	4710
North Bay	2236	1770	484	59	246	208	419	552	5973
North Los Angeles	1099	1976	16	32	422	187	306	290	4327
Orange	1550	2435	168	39	354	138	211	80	4976
Redwood Coast	1098	1729	64	71	831	106	482	115	4496
San Andreas	1657	1967	111	44	514	110	291	285	4979
San Diego	1155	2106	45	66	644	78	119	32	4246
San Gab/Pomona	1619	2006	862	74	313	65	196	85	5220
South Central LA	1294	1978	1050	49	110	76	85	87	4730
Tri-Counties	1297	2327	23	278	128	14	357	226	4650
Valley Mountain	1696	2903	66	104	258	52	192	94	5365
Westside	1719	2541	428	66	322	192	276	134	5678
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.A.14**

Year 1995-1996, 1% Trimmed Cost Values, Average Per Client Service Expenditures by Regional Center: (b) Other Independent Variables Controlled

Regional Center	Service Category								POS Total
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	
Alta	1351	1968	-32	120	10	-7	553	85	4048
Central Valley	1229	1603	-74	59	-134	-32	507	51	3209
East Bay	1365	1849	-72	209	-152	64	683	70	4015
East Los Angeles	1618	2470	31	44	14	55	500	122	4854
Far Northern	1336	1860	-23	123	-144	-25	739	135	4000
Golden Gate	1542	2757	2	0	-130	-16	426	44	4625
Harbor	1529	1924	116	134	-278	-32	448	323	4165
Inland	1097	1553	152	13	-220	-57	323	24	2886
Kern	1816	2105	-3	118	-206	-17	653	279	4744
Lanterman	1558	1655	352	89	-119	93	445	37	4110
North Bay	1649	1447	351	8	-197	140	584	430	4412
North Los Angeles	1136	2093	-63	-15	-17	125	496	205	3960
Orange	1453	2251	51	-11	-107	80	402	3	4121
Redwood Coast	1269	1649	-21	32	383	28	618	-61	3897
San Andreas	1545	1926	-5	-12	37	41	503	203	4237
San Diego	1261	2104	-49	23	202	16	312	-48	3821
San Gab/Pomona	1293	1560	728	37	-62	21	405	36	4018
South Central LA	1345	2083	936	16	-358	22	359	75	4478
Tri-Counties	1565	2329	-62	229	-287	-42	530	112	4374
Valley Mountain	1470	2974	-39	64	-170	-9	416	11	4717
Westside	1875	2662	335	22	-153	126	488	67	5422
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.A.15**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Gender

Gender	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Female	1300	2112	221	106	317	70	256	151	4534
Male	1459	1953	212	98	340	86	259	167	4575
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
Female	1401	2056	124	67	-97	27	496	99	4173
Male	1485	2022	125	57	-102	28	493	111	4218
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Service

**Table IV.A.16**

Year 1995-1996, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	843	1346	138	70	282	80	183	82	3024
Black	1094	1850	371	76	255	85	208	122	4060
Filipino	887	1631	193	106	412	78	169	123	3598
Hispanic	809	1349	181	90	324	50	162	99	3064
Native American	1235	2104	135	67	221	34	312	137	4243
Other	1008	1179	102	152	520	122	296	175	3556
Polynesian	744	1827	180	83	450	56	180	52	3573
Unknown	638	1199	63	190	416	62	341	142	3050
White	1881	2588	227	108	329	89	319	207	5748
Mean	1200	1927	174	43	231	24	169	68	4557
Residual SD	2312	3036	489	192	625	179	567	385	5367
Other Independent Variables Controlled									
Asian	1543	1741	111	33	-213	20	468	86	3789
Black	1167	2079	165	48	-78	39	477	98	3996
Filipino	1612	1931	148	76	-76	16	465	105	4277
Hispanic	1558	1995	87	49	-184	-3	468	107	4077
Native American	1263	2146	116	43	-166	19	494	106	4021
Other	1539	1998	129	85	-34	52	536	150	4456
Polynesian	1440	2161	110	45	-40	20	464	31	4230
Unknown	1390	2153	118	96	-120	15	551	107	4310
White	1476	2147	134	83	14	68	529	156	4608
Mean	1177	1964	112	41	-14	8	273	63	4196
Residual SD	2312	3036	489	192	625	179	567	385	5367

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

## **B. FISCAL YEAR 1996-1997**

The results of analyses for Fiscal Year 1996-97 were, in broad strokes, fairly similar to those for 1995-96. As a result, we have reported results of all analyses in Appendix C and will concentrate here on examining the variance explained by each independent variable and the mean expenditures as a function of biasing factors.

Variance explained. The variance explained by each independent variable is shown in Table IV.B.1, first without other independent variables controlled (see top half of table) and then with other independent variables controlled (see bottom half of table). The controlled analyses show that consumer age and residence had the largest effects on POS Total, or the total sum of service costs. Of the component cost categories, age group had its effects primarily on Out of Home, Day Program, Transportation, and In Home Respite costs; residence type had its effects largely on Out of Home, Day Program, and Other costs. Client Characteristic had its smaller effects primarily on Day Program and In Home Respite costs, and Level of Mental Retardation had fairly minor effects on every cost category. Adaptive Behavior had its largest and only notable effect on In Home Respite costs, as parents/guardians of consumers with higher levels of maladaptive behaviors using larger dollar amounts of respite services.

As for the biasing factors, Regional Center had a rather large effect on Transportation costs and had smaller, yet consistent effects on several cost categories. Both Consumer Gender and Consumer Ethnicity had negligible effects on all cost categories, at least with regard to variance explained and after other independent variables were controlled statistically.

Cost variation as a function of biasing factors. The unadjusted mean expenditures as a function of regional center are shown in Table IV.B.2. These means show a fairly large difference between the highest-spending center (Westside) and the lowest-spending center (Inland), a difference of \$ 2,584 per year, corresponding to a Cohen's *d* of 0.46, a moderate-sized effect. The adjusted means are shown in Table IV.B.3. There, the difference between the highest and lowest spending centers (still Westside and Inland, respectively) was slightly increased, a difference of \$2,790 per year, a Cohen's *d* of 0.49. Thus, partialing out the other independent variables did little to diminish the differences in service costs among regional centers. The largest differences appeared to arise in the Out of Home, Day Program, and Transportation cost categories, which appeared to be largely responsible for the differences in POS Total, or total expenditures. For example, there was an approximate \$ 700 difference in Out of Home costs between the highest and lowest spending regional centers, and an over \$ 1,000 difference in Day Program costs between the highest and lowest spending centers. In the Transportation category, five or six regional centers had much higher levels of expenditures than did other centers, many of which had negligible transportation expenses. The basis for these differences across regional centers will be sought from survey and focus group results in later POS II reports, as the differences are likely to have resulted from factors that were unmeasured in the current study.

Expenditure differences as a function of Consumer Ethnicity are shown in Table IV.B.4; mean expenditures with other independent variables not controlled are shown in the top half of

the table, and results with other independent variables controlled are shown in the bottom half of the table. In the top half, the difference between the White and Hispanic groups (which had the highest and lowest levels of expenditures, respectively, of the identified ethnic groups) was \$2,931 per year, corresponding to a Cohen's  $d$  of 0.52, a fairly large effect. After controlling for the effects of other independent variables, the difference between the most extreme groups – Whites and Asians – was only \$ 857 per year, a Cohen's  $d$  of only 0.15, a rather small effect. Thus, controlling statistically the effects of other independent variables had a substantial effect on the apparent differences across ethnic groups in average levels of expenditures, with relatively small differences among groups remaining after controlling for other independent variables.

The differences in mean expenditures between male and female consumers were so small as to require no presentation of results here. Interested readers can find these results reported in Appendix C. The differences as a function of Consumer Gender were small in both the uncontrolled and the controlled analyses, associated with Cohen's  $d$  values less than 0.05.

**Table IV.B.1**

Year 1996-1997, 1% Trimmed Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0048	.0070	.1043	.0179	.0162	.0062	.0194	.0232	.0089
Gender	.0001	.0006	.0001	.0001	.0003	.0001	.0000	.0000	.0000
Ethnicity	.0198	.0234	.0041	.0024	.0040	.0012	.0038	.0010	.0330
Age Group	.0649	.2046	.0794	.0186	.0693	.0037	.0031	.0017	.1256
Residence	.5192	.1865	.0609	.0033	.0598	.0038	.0556	.0223	.3056
Client Characteristic	.0604	.1086	.0396	.0199	.0659	.0028	.0042	.0034	.1112
Mental Retardation	.0323	.1074	.0376	.0060	.0180	.0009	.0047	.0033	.0805
Adaptive Behaviors	.0360	.0183	.0087	.0249	.0723	.0051	.0148	.0078	.0496
Other Independent Variables Controlled									
Regional Center	.0024	.0073	.0973	.0182	.0159	.0057	.0145	.0226	.0071
Gender	.0001	.0000	.0000	.0000	.0001	.0000	.0000	.0000	.0000
Ethnicity	.0007	.0004	.0005	.0004	.0024	.0015	.0006	.0004	.0014
Age Group	.0649	.2046	.0794	.0186	.0693	.0037	.0031	.0017	.1256
Residence	.4581	.0929	.0398	.0001	.0181	.0014	.0585	.0211	.2130
Client Characteristic	.0080	.0327	.0062	.0096	.0313	.0017	.0046	.0023	.0450
Mental Retardation	.0007	.0140	.0049	.0006	.0038	.0003	.0005	.0003	.0081
Adaptive Behaviors	.0038	.0104	.0041	.0063	.0187	.0032	.0055	.0030	.0173
Multiple R <sup>2</sup>	.5386	.3623	.2347	.0544	.1602	.0181	.0881	.0512	.4173

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = Other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.B.2**

Year 1996-1997, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (a) Other Independent Variables Not Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	1236	1974	88	32	246	51	181	69	4699
Central Valley	1264	1911	46	62	303	8	114	85	4167
East Bay	1327	2139	28	13	211	39	173	67	5259
East Los Angeles	1027	1659	455	39	360	42	215	229	4704
Far Northern	1345	1633	28	107	226	27	398	140	4564
Golden Gate	1548	3021	104	21	172	30	102	41	5781
Harbor	923	1559	188	95	139	11	77	464	3955
Inland	1054	1591	273	25	176	3	92	66	3658
Kern	1310	2013	92	78	244	38	283	316	4988
Lanterman	1515	1643	366	59	243	25	173	86	5077
North Bay	1952	1834	488	48	165	54	134	222	6166
North Los Angeles	867	1722	23	26	274	41	141	151	4291
Orange	1436	2061	174	22	294	35	115	47	5083
Redwood Coast	988	1700	52	61	419	57	359	84	4929
San Andreas	1558	2091	169	5	380	49	216	110	5691
San Diego	1049	1980	51	37	428	27	103	23	4428
San Gab/Pomona	1344	2063	657	30	225	31	150	97	5619
South Central LA	1361	2061	562	46	101	13	61	29	5244
Tri-Counties	1078	2268	15	81	121	12	167	117	5014
Valley Mountain	1584	2394	69	32	246	46	159	100	5417
Westside	1442	2501	460	26	283	76	182	216	6242
Mean	1269	1980	192	41	249	31	151	115	4863
Residual SD	2391	3084	508	182	641	223	470	645	5666

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = Other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.B.3**

Year 1996-1997, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (b) Other Independent Variables Controlled

Regional Center	Service Category								POS Total
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	
Alta	1216	2175	11	32	33	32	262	49	4705
Central Valley	1172	1873	-43	58	66	-9	218	91	3900
East Bay	1190	2141	-65	10	-40	15	254	45	4732
East Los Angeles	1458	2122	409	34	98	25	332	239	5685
Far Northern	1226	1907	-26	107	4	5	442	78	4250
Golden Gate	1392	2980	-1	22	-45	9	199	24	5363
Harbor	1332	1894	138	90	-122	-9	162	451	4526
Inland	1026	1628	198	21	-80	-19	193	60	3427
Kern	1695	2305	41	77	-11	16	362	287	5476
Lanterman	1346	1682	288	50	-19	7	275	85	4714
North Bay	1477	1619	388	43	-84	30	198	180	4954
North Los Angeles	991	2025	-26	19	16	19	217	127	4412
Orange	1299	1969	78	16	44	15	199	34	4456
Redwood Coast	1174	1810	-1	60	178	32	376	1	4645
San Andreas	1420	2091	76	-2	111	26	304	91	5178
San Diego	1085	2045	-23	32	178	5	184	2	4142
San Gab/Pomona	993	1619	555	28	15	16	250	97	4558
South Central LA	1268	2161	509	41	-171	-9	191	51	5182
Tri-Counties	1340	2444	-47	77	-118	-7	228	79	5083
Valley Mountain	1325	2594	-12	30	7	26	241	78	5030
Westside	1592	2650	393	17	-4	51	276	202	6217
Mean	1286	2082	135	41	3	13	255	112	4792
Residual SD	2391	3084	508	182	641	223	470	645	5666

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = Other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.B.4**

Year 1996-1997, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	690	1408	164	30	244	34	110	77	3299
Black	1040	1851	243	29	204	38	114	106	4398
Filipino	705	1649	179	32	302	36	101	95	3866
Hispanic	717	1315	170	47	289	19	120	90	3249
Native American	1206	2213	126	39	176	38	187	106	4630
Other	823	1132	104	54	371	49	162	113	3747
Polynesian	978	1913	208	20	234	22	121	76	4121
Unknown	507	999	63	87	312	30	160	150	2962
White	1758	2545	211	38	222	32	179	133	6180
Mean	1269	1980	192	41	249	31	151	115	4863
Residual SD	2391	3084	508	182	641	223	470	645	5666
Other Independent Variables Controlled									
Asian	1318	1843	140	35	-52	9	243	101	4422
Black	1060	2109	147	37	25	22	243	112	4602
Filipino	1335	1951	147	39	27	12	249	109	4842
Hispanic	1402	2051	109	44	-15	-1	251	106	4688
Native American	1070	2253	120	38	-26	24	248	119	4521
Other	1351	2003	135	47	39	22	276	128	5025
Polynesian	1477	2224	155	22	-19	5	251	77	4966
Unknown	1223	2140	127	62	-18	6	262	118	4784
White	1342	2168	137	45	63	20	275	138	5279
Mean	1286	2082	135	41	3	13	255	112	4792
Residual SD	2391	3084	508	182	641	223	470	645	5666

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = Other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

### C. FISCAL YEAR 1997-1998

The results of analyses for Fiscal Year 1997-98 were once again fairly similar to those for the preceding two years. As a result, we have reported results of all analyses in Appendix D and will concentrate here on examining the variance explained by each independent variable and the mean expenditures as a function of biasing factors.

Variance explained. The variance explained by each independent variable is shown in Table IV.C.1, first without other independent variables controlled (see top half of table) and then with other independent variables controlled (see bottom half of table). The controlled analyses show that consumer age and residence had the largest effects on POS Total, or the total sum of service costs. Of the component cost categories, age group had its effects primarily on Out of Home, Day Program, Transportation, and In Home Respite costs; residence type had its effects largely on Out of Home, Day Program, and Other costs. Client Characteristic had its smaller effects primarily on Day Program and In Home Respite costs, and Level of Mental Retardation had fairly minor effects on every cost category. Adaptive Behavior had its largest and only notable effect on In Home Respite costs.

As for the biasing factors, Regional Center had a rather large effect on Transportation costs and had smaller, yet consistent effects on several cost categories. Both Consumer Gender and Consumer Ethnicity had negligible effects on all cost categories, at least with regard to variance explained and after other independent variables were controlled statistically.

Cost variation as a function of biasing factors. The unadjusted mean expenditures as a function of regional center are shown in Table IV.C.2. These means show a fairly large difference between the highest-spending center (North Bay) and the lowest-spending center (Inland), a difference of \$ 3,038 per year, corresponding to a Cohen's  $d$  of 0.50, a moderate-sized effect. The adjusted means are shown in Table IV.C.3. There, the difference between the highest and lowest spending centers (now Westside and Inland, respectively) decreased slightly, a difference of \$2,728 per year, a Cohen's  $d$  of 0.45. Thus, partialing out the other independent variables did little to diminish the differences in service costs among regional centers. The largest differences appeared to arise in the Out of Home, Day Program, and Transportation cost categories, which appeared to be largely responsible for the differences in POS Total, or total expenditures. For example, there was an approximate \$ 700 difference in Out of Home costs between the highest and lowest spending regional centers (Westside and North Los Angeles, respectively), and an almost \$ 1,500 difference in Day Program costs between the highest and lowest spending centers (Golden Gate and Inland, respectively). In the Transportation category, five or six regional centers had much higher levels of expenditures than did other centers, many of which had negligible transportation expenses. The basis for these differences across regional centers will be sought from survey and focus group results in later POS II reports, as the differences are likely to have resulted from factors that were unmeasured in the current study.

Expenditure differences as a function of Consumer Ethnicity are shown in Table IV.C.4; mean expenditures with other independent variables not controlled are shown in the top half of the table, and results with other independent variables controlled are shown in the bottom half of

the table. In the top half, the difference in expenditures between the White and Hispanic groups (which had the highest and lowest levels of expenditures, respectively, of the identified ethnic groups) was substantial, \$ 3,343 per year, corresponding to a Cohen's  $d$  of 0.55, a fairly large effect. Indeed, the ratio of costs for Whites:Hispanics was almost 2:1. However, after controlling for the effects of other independent variables, the difference between the most extreme groups – Whites and Native Americans – was only \$ 858 per year, a Cohen's  $d$  of only 0.14, a rather small effect. Thus, controlling statistically the effects of other independent variables had a substantial effect on the apparent differences across ethnic groups in average levels of expenditures, with relatively small differences among groups remaining after controlling for other independent variables.

The differences in mean expenditures between male and female consumers were so small as to require no presentation of results here. Interested readers can find these results reported in Appendix D. The differences as a function of Consumer Gender were extremely small in both the uncontrolled and the controlled analyses, associated with Cohen's  $d$  values less than 0.05.

**Table IV.C.1**

Year 1997-1998, 1% Trimmed Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0040	.0079	.0830	.0244	.0180	.0083	.0229	.0148	.0091
Gender	.0003	.0007	.0002	.0001	.0004	.0001	.0000	.0000	.0000
Ethnicity	.0197	.0243	.0050	.0033	.0048	.0014	.0040	.0024	.0355
Age Group	.0622	.2139	.0828	.0185	.0765	.0058	.0024	.0045	.1309
Residence	.5233	.1908	.0558	.0033	.0687	.0045	.0537	.0190	.3281
Client Characteristic	.0601	.1042	.0362	.0147	.0609	.0039	.0041	.0050	.1051
Mental Retardation	.0339	.1099	.0365	.0053	.0206	.0022	.0052	.0012	.0745
Adaptive Behaviors	.0390	.0165	.0077	.0221	.0777	.0058	.0122	.0096	.0500
Other Independent Variables Controlled									
Regional Center	.0015	.0073	.0810	.0246	.0164	.0074	.0168	.0139	.0077
Gender	.0002	.0000	.0000	.0000	.0001	.0000	.0000	.0000	.0000
Ethnicity	.0006	.0004	.0006	.0006	.0026	.0019	.0007	.0004	.0012
Age Group	.0622	.2139	.0828	.0185	.0765	.0058	.0024	.0045	.1309
Residence	.4648	.0928	.0349	.0002	.0211	.0013	.0564	.0153	.2287
Client Characteristic	.0094	.0291	.0052	.0051	.0265	.0019	.0043	.0041	.0404
Mental Retardation	.0010	.0135	.0045	.0009	.0066	.0009	.0005	.0001	.0079
Adaptive Behaviors	.0040	.0112	.0032	.0086	.0239	.0037	.0053	.0043	.0195
Multiple R <sup>2</sup>	.5438	.3682	.2137	.0592	.1744	.0235	.0871	.0424	.4362

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.C.2**

Year 1997-1998, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (a) Other Independent Variables Not Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	1399	2072	102	16	242	51	182	189	5093
Central Valley	1533	2069	52	71	370	8	95	186	4642
East Bay	1591	2265	14	10	237	48	231	148	5898
East Los Angeles	1206	1702	479	39	398	48	219	488	5092
Far Northern	1497	1665	29	113	246	30	492	317	5160
Golden Gate	2060	3263	106	25	192	29	93	107	6529
Harbor	1333	1575	226	103	148	13	123	587	4433
Inland	1377	1595	291	23	203	5	137	115	3961
Kern	1280	2005	104	87	260	43	360	582	5615
Lanterman	1859	1772	396	55	277	37	198	211	5691
North Bay	2255	1916	505	68	178	85	132	646	6999
North Los Angeles	1129	1856	32	30	331	73	205	315	4935
Orange	1636	2015	179	13	302	50	109	148	5377
Redwood Coast	1215	1734	59	59	424	67	469	316	5721
San Andreas	1810	2224	335	7	468	79	213	203	6406
San Diego	1267	1964	52	36	437	36	121	86	4681
San Gab/Pomona	1942	2173	253	33	243	42	156	190	5631
South Central LA	1836	2154	565	51	104	13	63	59	5755
Tri-Counties	1525	2400	15	85	144	21	171	248	5843
Valley Mountain	1828	2474	101	31	281	55	171	301	5867
Westside	1727	2285	437	24	304	124	198	447	6509
Mean	1561	2045	188	41	275	41	173	241	5335
Residual SD	2975	3130	498	181	663	289	547	1268	6109

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.C.3**

Year 1997-1998, 1% Trimmed Cost Values, Average Per Client Service Expenditures by Regional Center: (b) Other Independent Variables Controlled

Regional Center	Service Category								POS Total
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	
Alta	1502	2193	31	13	9	31	308	200	5286
Central Valley	1526	1951	-28	65	118	-8	247	233	4563
East Bay	1520	2193	-68	4	-37	21	348	133	5411
East Los Angeles	1795	2044	437	31	115	33	388	559	6297
Far Northern	1512	1874	-21	111	10	5	575	246	5002
Golden Gate	1819	3006	-2	22	-38	10	236	108	5962
Harbor	1829	1814	177	93	-132	-7	253	599	5118
Inland	1406	1513	220	15	-75	-18	286	139	3838
Kern	1835	2213	54	84	-7	20	487	590	6333
Lanterman	1693	1680	320	44	2	20	352	244	5428
North Bay	1693	1591	410	60	-84	59	239	593	5741
North Los Angeles	1342	2094	-14	20	53	51	324	310	5220
Orange	1610	1874	91	4	29	30	244	151	4986
Redwood Coast	1525	1670	1	55	172	38	520	204	5444
San Andreas	1742	2128	251	-4	169	52	348	200	6006
San Diego	1378	1914	-21	28	162	12	247	77	4450
San Gab/Pomona	1519	1614	148	26	14	29	307	206	4577
South Central LA	1730	2118	522	43	-187	-6	236	140	5780
Tri-Counties	1866	2493	-44	79	-103	2	280	218	6005
Valley Mountain	1615	2489	24	26	22	32	298	296	5521
Westside	1990	2338	383	12	-1	98	316	428	6566
Mean	1640	2038	137	40	10	24	326	280	5406
Residual SD	2975	3130	498	181	663	289	547	1268	6109

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.C.4**

Year 1997-1998, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	905	1522	181	30	290	40	117	176	3737
Black	1384	1958	233	26	221	47	145	204	4949
Filipino	919	1817	184	41	323	38	133	186	4365
Hispanic	862	1366	157	50	320	26	130	160	3502
Native American	1391	2173	131	40	177	28	209	181	5158
Other	1000	1188	99	50	413	70	187	222	4069
Polynesian	1257	2104	226	58	217	63	125	77	4592
Unknown	529	884	63	91	320	42	201	292	2981
White	2174	2637	212	37	243	45	206	301	6845
Mean	1561	2045	188	41	275	41	173	241	5335
Residual SD	2975	3130	498	181	663	289	547	1268	6109
Other Independent Variables Controlled									
Asian	1726	1799	152	30	-27	14	305	294	5083
Black	1384	2105	144	28	45	31	320	280	5236
Filipino	1723	1968	148	42	30	12	330	294	5546
Hispanic	1756	1997	105	40	0	4	313	270	5277
Native American	1346	2065	109	31	-25	17	299	222	5037
Other	1704	1961	128	37	62	38	346	314	5600
Polynesian	1960	2320	180	54	-42	46	314	183	5815
Unknown	1444	2016	129	56	-37	17	357	330	5168
White	1719	2114	135	38	85	36	348	330	5895
Mean	1640	2038	137	40	10	24	326	280	5406
Residual SD	2975	3130	498	181	663	289	547	1268	6109

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = Medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-Medical, Supp svcs = support services, POS Total = total Purchase of Services

#### **D. FISCAL YEAR 1998-1999**

The results of analyses for Fiscal Year 1998-99 were, in general, quite similar to those for the preceding three fiscal years. As a result, we have reported results of all analyses in Appendix E and will concentrate here on examining the variance explained by each independent variable and the mean expenditures as a function of biasing factors.

Variance explained. The variance explained by each independent variable is shown in Table IV.D.1, first without other independent variables controlled (see top half of table) and then with other independent variables controlled (see bottom half of table). The controlled analyses show that consumer age and residence had the largest effects on POS Total, or the total sum of service costs. Indeed, these two independent variables explained almost 40 percent of the variance of the POS Total variable, and the remaining six independent variables explained only another 6 percent of the variance. Of the component cost categories, age group had its effects primarily on Out of Home, Day Program, Transportation, and In Home Respite costs; residence type had its effects largely on Out of Home, Day Program, and Other costs. Client Characteristic had its smaller effects primarily on Day Program and In Home Respite costs, and Level of Mental Retardation had fairly minor effects on every cost category. Adaptive Behavior had its largest and only notable effect on In Home Respite costs, once again arising from increased levels of respite services provided for parents/guardians of consumers with higher levels of maladaptive behaviors.

As for the biasing factors, Regional Center continued to have a rather large effect on Transportation costs and had smaller, yet consistent effects on several cost categories. Both Consumer Gender and Consumer Ethnicity had negligible effects on all cost categories, at least with regard to variance explained and after other independent variables were controlled.

Cost variation as a function of biasing factors. The unadjusted mean expenditures as a function of regional center are shown in Table IV.D.2. These means show a fairly large difference between the highest-spending center (North Bay) and the lowest-spending center (Harbor), a difference of \$ 3,270 per year, corresponding to a Cohen's  $d$  of 0.49, a moderate-sized effect. The adjusted means are shown in Table IV.D.3. There, the difference between the highest and lowest spending centers (now Westside and Inland, respectively) was slightly decreased, a difference of \$2,715 per year, a Cohen's  $d$  of 0.40. Thus, partialing out the other independent variables had a modest effect in diminishing the differences in service costs among regional centers, reducing the largest difference between regional centers, on a Cohen's  $d$  metric from 0.49 to 0.40. But, notable differences across regional centers remain even after controlling other independent variables. The largest differences appeared to arise in the Out of Home, Day Program, and Transportation cost categories, which appeared to be largely responsible for the differences in POS Total, or total expenditures. For example, there was an approximate \$ 600 difference in Out of Home costs between the highest and lowest spending regional centers (Westside and North Los Angeles, respectively), and an over \$ 1,500 difference in Day Program costs between the highest and lowest spending centers (Golden Gate and Redwood Coast, respectively). In the Transportation category, five or six regional centers had much higher levels of expenditures than did other centers, many of which had negligible transportation expenses.

The basis for these differences across regional centers will be sought from survey and focus group results in later POS II reports, as the differences are likely to have resulted from factors that were unmeasured in the current study.

Expenditure differences as a function of Consumer Ethnicity are shown in Table IV.D.4; mean expenditures with other independent variables not controlled are shown in the top half of the table, and results with other independent variables controlled are shown in the bottom half of the table. In the top half, the difference between the White and Hispanic groups (which had the highest and lowest levels of expenditures, respectively, of the identified ethnic groups) was rather large, \$ 3,788 per year, corresponding to a Cohen's  $d$  of 0.56, a fairly large effect. After controlling for the effects of other independent variables, the difference between the most extreme groups – Whites and Native Americans – was still somewhat large, \$ 1,667 per year, corresponding to a Cohen's  $d$  of 0.25. But, the Native American group is rather small in number, so the mean for this group is not as reliable a figure. For the larger ethnic groups, the difference between the most extreme groups – Whites and Asians – was only \$ 815 per year, a Cohen's  $d$  of only 0.12, a rather small effect. Thus, controlling statistically the effects of other independent variables had a substantial effect on the apparent differences across ethnic groups in average levels of expenditures, with relatively small differences among groups remaining after controlling for other independent variables.

The differences in mean expenditures between male and female consumers were so small as to require no presentation of results here. Interested readers can find these results reported in Appendix E. The differences as a function of Consumer Gender were extremely small in both the uncontrolled and the controlled analyses, associated with Cohen's  $d$  values less than 0.05.

**Table IV.D.1**

Year 1998-1999, 1% Trimmed Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0043	.0077	.0870	.0265	.0203	.0106	.0240	.0130	.0095
Gender	.0003	.0009	.0002	.0002	.0005	.0001	.0000	.0000	.0000
Ethnicity	.0224	.0252	.0060	.0047	.0066	.0013	.0031	.0026	.0370
Age Group	.0705	.2200	.0876	.0173	.0837	.0072	.0017	.0067	.1341
Residence	.5804	.1960	.0552	.0033	.0779	.0055	.0388	.0234	.3664
Client Characteristic	.0602	.1010	.0353	.0145	.0657	.0048	.0045	.0050	.1018
Mental Retardation	.0352	.1105	.0368	.0051	.0207	.0029	.0048	.0010	.0724
Adaptive Behaviors	.0372	.0152	.0071	.0213	.0834	.0064	.0103	.0109	.0479
Other Independent Variables Controlled									
Regional Center	.0009	.0064	.0851	.0260	.0184	.0096	.0192	.0126	.0070
Gender	.0002	.0000	.0000	.0000	.0002	.0000	.0000	.0000	.0000
Ethnicity	.0005	.0005	.0005	.0008	.0024	.0022	.0008	.0004	.0011
Age Group	.0705	.2200	.0876	.0173	.0837	.0072	.0017	.0067	.1314
Residence	.5130	.0907	.0324	.0001	.0245	.0015	.0420	.0179	.2601
Client Characteristic	.0075	.0261	.0045	.0047	.0277	.0027	.0055	.0042	.0368
Mental Retardation	.0009	.0127	.0046	.0009	.0065	.0011	.0004	.0001	.0068
Adaptive Behaviors	.0034	.0106	.0035	.0088	.0243	.0031	.0052	.0050	.0182
Multiple R <sup>2</sup>	.5969	.3669	.2199	.0600	.1885	.0276	.0755	.0466	.4640

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.D.2**

Year 1998-1999, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (a) Other Independent Variables Not Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	1697	2270	102	17	307	65	190	175	5668
Central Valley	1832	2319	59	83	511	14	109	216	5499
East Bay	1920	2436	22	10	300	61	212	145	6566
East Los Angeles	1327	1851	467	46	530	64	290	618	5889
Far Northern	1836	1857	25	117	305	26	545	367	6013
Golden Gate	2432	3429	115	32	253	41	87	151	7497
Harbor	1443	1651	227	126	155	17	132	630	4642
Inland	1631	1726	329	23	266	8	198	180	4673
Kern	1430	2114	99	74	362	38	431	664	6326
Lanterman	2173	1953	393	63	408	59	267	301	6599
North Bay	2756	2420	541	65	209	86	141	646	7912
North Los Angeles	1343	1959	39	39	441	101	241	424	5629
Orange	1850	2175	191	15	406	67	110	213	6138
Redwood Coast	1458	1751	79	46	486	58	513	371	6659
San Andreas	2198	2479	452	7	618	128	200	253	7722
San Diego	1634	2056	60	38	523	38	130	108	5272
San Gab/Pomona	2298	2248	199	38	293	59	142	261	6238
South Central LA	2110	2380	664	52	138	17	78	77	6601
Tri-Counties	1778	2692	14	94	243	24	204	321	6678
Valley Mountain	2179	1861	475	34	405	59	193	378	6297
Westside	1918	2217	632	30	375	173	202	556	7361
Mean	1847	2175	224	45	359	53	193	292	6071
Residual SD	3265	3318	585	191	796	356	610	1476	6716

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.D.3**

Year 1998-1999, 1% Trimmed Cost Values, Average Per Client Service Expenditures by Regional Center: (b) Other Independent Variables Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	1943	2686	21	10	-1	36	291	173	6157
Central Valley	1930	2503	-31	74	180	-10	241	256	5708
East Bay	1966	2695	-66	1	-72	22	306	116	6358
East Los Angeles	2119	2513	418	34	135	40	431	691	7453
Far Northern	1964	2273	-39	113	-4	-8	604	254	5978
Golden Gate	2217	3462	-13	26	-62	12	207	134	6988
Harbor	2097	2176	169	110	-218	-11	242	642	5668
Inland	1847	1952	249	14	-104	-24	321	194	4895
Kern	2137	2571	37	68	9	7	538	657	7305
Lanterman	2111	2162	305	46	22	32	391	329	6551
North Bay	2068	2299	423	56	-126	51	226	560	6454
North Los Angeles	1692	2524	-10	24	63	70	334	410	6221
Orange	1944	2274	89	3	33	36	218	203	5906
Redwood Coast	1857	1948	9	39	165	20	549	216	6595
San Andreas	2217	2663	368	-7	213	90	311	231	7457
San Diego	1758	2227	-29	26	155	5	233	77	5086
San Gab/Pomona	2123	2083	86	30	-15	39	269	275	5714
South Central LA	2125	2627	603	41	-260	-11	224	164	6855
Tri-Counties	2185	2998	-61	86	-84	-3	292	270	6964
Valley Mountain	1995	2134	386	25	63	27	298	357	6091
Westside	2304	2518	556	17	-26	137	294	523	7610
Mean	2028	2442	165	40	3	26	325	321	6382
Residual SD	3265	3318	585	191	796	356	610	1476	6716

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.D.4**

Year 1998-1999, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	1061	1629	209	36	405	62	129	213	4381
Black	1717	2087	288	30	279	60	167	239	5748
Filipino	1067	1960	202	39	437	63	143	201	4893
Hispanic	1001	1484	182	53	427	36	155	199	4051
Native American	1580	2243	163	38	248	16	192	295	5212
Other	1153	1303	123	52	539	88	202	259	4656
Polynesian	1373	2206	265	41	268	68	114	151	4989
Unknown	517	828	75	110	382	47	182	304	3027
White	2618	826	257	39	10	56	227	370	7839
Mean	1847	2175	224	45	359	53	193	292	6071
Residual SD	3265	3318	585	191	796	356	610	1476	6716
Other Independent Variables Controlled									
Asian	2169	2194	179	33	-25	21	310	326	6218
Black	1845	2511	181	32	47	40	338	302	6388
Filipino	2118	2371	161	37	41	25	336	307	6541
Hispanic	2197	2414	136	41	-1	4	324	296	6378
Native American	1544	2423	135	31	-22	8	270	321	5364
Other	2154	2392	157	37	75	45	348	350	6743
Polynesian	2204	2627	215	37	-84	40	304	272	6477
Unknown	1861	2518	159	70	-91	10	327	342	6292
White	2164	2530	164	39	88	46	364	370	7033
Mean	2028	2442	165	40	3	26	325	321	6382
Residual SD	3265	3318	585	191	796	356	610	1476	6716

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

## E. FISCAL YEAR 1999-2000

The results of analyses for Fiscal Year 1999-2000 were, not surprisingly, fairly similar to those for the preceding four fiscal years. However, the 1999-2000 fiscal year is the most recent snapshot available for analyses of purchase of services across the State of California, so a more complete reporting of results will be followed in this section. We have reported results of all analyses in Appendix F and will concentrate here on examining the variance explained by each independent variable and the mean expenditures as a function of all independent variables, using the trimmed means.

Variance explained. The variance explained by each independent variable is shown in Table IV.E.1, first without other independent variables controlled (see top half of table) and then with other independent variables controlled (see bottom half of table). The controlled analyses show that consumer age and residence had the largest effects on POS Total, or the total sum of service costs. In fact, the two independent variables of consumer age and residence type explained over 44 percent of the variance of the POS Total outcome variable, and the remaining six independent variables explained only an additional 6 percent of the variance. Of the component cost categories, age group had its effects primarily on Out of Home, Day Program, Transportation, and In Home Respite costs; residence type had its effects largely on Out of Home and Day Program costs, with smaller effects on Transportation, In Home Respite, Other, and Support Services costs. Client Characteristic had its smaller effects primarily on Day Program and In Home Respite costs, and Level of Mental Retardation had fairly minor effects on every cost category. Adaptive Behavior had its largest and only notable effect on In Home Respite costs, where parents/guardians of consumers with higher levels of maladaptive behavior used greater dollar amounts of respite services.

As for the biasing factors, Regional Center continued to have a rather large effect on Transportation costs and had smaller, yet consistent effects on several cost categories. Both Consumer Gender and Consumer Ethnicity had negligible effects on all cost categories, at least with regard to variance explained.

Potential biasing factor #1: Regional center. The unadjusted mean expenditures as a function of regional center are shown in Table IV.E.2. These means show a fairly large difference between the highest-spending center (North Bay) and the lowest-spending center (Harbor), a difference of \$ 4,424 per year, corresponding to a Cohen's *d* of 0.60, a moderate-to-large sized effect. The adjusted means are shown in Table IV.E.3. There, the difference between the highest and lowest spending centers (now Westside and Inland, respectively) was considerably reduced, a difference of \$2,934 per year, a value that still corresponded to a Cohen's *d* of 0.40. Thus, partialing out the other independent variables diminished differences in service costs among regional centers to a moderate extent. The largest differences among regional centers appeared to arise in the Out of Home, Day Program, and Transportation cost categories, which appeared to be largely responsible for the differences in POS Total, or total expenditures. For example, there was an approximate \$ 750 difference in Out of Home costs between the highest and lowest spending regional centers (Westside and San Diego, respectively), and an almost \$ 1,700 difference in annual Day Program costs between the highest and lowest spending centers (Golden

Gate and Redwood Coast, respectively). In the Transportation category, five or six regional centers had much higher levels of expenditures than did other centers, many of which had negligible transportation expenses. In the remaining cost categories – Medical Care, In Home Respite, Out of Home Respite, Other, and Support Services – the differences between regional centers were fairly minor. The basis for the differences across regional centers in the Out of Home, Day Program, and Transportation categories will be sought from survey and focus group results in later POS II reports, as the differences are likely to have resulted from factors that were unmeasured in the current study.

Potential biasing factor #2: Consumer gender. The differences in mean expenditures between male and female consumers are shown in Table IV.E.4. These differences were very small in the uncontrolled analyses, shown in the top of the table. There, the annual difference in service costs between males and females was only \$ 42 per year, a Cohen's *d* of 0.01. In the bottom half of the table are shown the adjusted cost values after controlling for other independent variables. Here, the difference increased to \$ 145 per year, but this still was associated with a Cohen's *d* of .02. Thus, the differences in expenditures as a function of consumer gender is negligible.

Potential biasing factor #3: Consumer ethnicity. Expenditure differences as a function of Consumer Ethnicity are shown in Table IV.E.4; mean expenditures with other independent variables not controlled are shown in the top half of the table, and results with other independent variables controlled are shown in the bottom half of the table. In the top half, the difference between the White and Hispanic groups (which had the highest and lowest levels of expenditures, respectively, of the identified ethnic groups) was \$ 4,414 per year, corresponding to a Cohen's *d* of 0.60, a fairly large effect. The magnitude of this difference is underscored by the approximately 2:1 difference in spending on White vs. Hispanic consumers. However, after controlling for the effects of other independent variables, the difference between the most extreme groups – Whites and Native Americans – was a reduced \$ 1,695 per year, associated with a Cohen's *d* of 0.23. As with a previous year, the Native American group was rather small, so the mean difference between the most extreme, larger ethnic groups – Whites and Asians – was only \$ 832 per year, a Cohen's *d* of only 0.11, a rather small effect. Thus, controlling statistically the effects of other independent variables had a substantial effect on the apparent differences across ethnic groups in average levels of expenditures, with relatively small differences among groups remaining after controlling for other independent variables.

**Table IV.E.1**

Year 1999-2000, 1% Trimmed Cost Values – Variance Explained by Each Independent Variable:  
Other Independent Variables Not Controlled and Other Independent Variables Controlled

Independent Variable	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Regional Center	.0050	.0083	.0832	.0236	.0212	.0139	.0232	.0102	.0094
Gender	.0002	.0010	.0004	.0002	.0006	.0001	.0001	.0000	.0000
Ethnicity	.0233	.0265	.0074	.0048	.0078	.0013	.0033	.0031	.0383
Age Group	.0711	.2273	.0917	.0211	.0877	.0087	.0014	.0075	.1345
Residence	.6269	.2122	.0644	.0038	.0836	.0059	.0279	.0261	.4254
Client Characteristic	.0582	.1072	.0391	.0196	.0787	.0564	.0054	.0058	.1000
Mental Retardation	.0358	.1113	.0345	.0055	.0229	.0044	.0053	.0014	.0697
Adaptive Behaviors	.0350	.0147	.0078	.0245	.0904	.0069	.0113	.0120	.0423
Other Independent Variables Controlled									
Regional Center	.0010	.0062	.0827	.0238	.0191	.0123	.0190	.0098	.0075
Gender	.0002	.0000	.0000	.0000	.0002	.0000	.0000	.0000	.0000
Ethnicity	.0001	.0004	.0005	.0009	.0012	.0019	.0009	.0006	.0008
Age Group	.0711	.2273	.0917	.0211	.0877	.0087	.0014	.0075	.1345
Residence	.5576	.0944	.0338	.0003	.0356	.0014	.0293	.0202	.3089
Client Characteristic	.0061	.0223	.0030	.0068	.0346	.0028	.0071	.0041	.0305
Mental Retardation	.0006	.0115	.0037	.0005	.0044	.0019	.0010	.0004	.0039
Adaptive Behaviors	.0032	.0085	.0027	.0087	.0239	.0027	.0062	.0039	.0149
Multiple R <sup>2</sup>	.6400	.3706	.2198	.0629	.1980	.0320	.0654	.0463	.5007

*Note:* Tabled values are either squared correlations or squared semipartial correlations, indicating the proportion of variance explained by the independent variable. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.E.2**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Regional Center: (a) Other Independent Variables Not Controlled

Regional Center	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Alta	2278	2285	279	29	365	92	224	235	6741
Central Valley	2427	2434	60	91	593	14	128	197	6218
East Bay	2452	2569	34	11	372	98	200	170	7072
East Los Angeles	1492	1840	457	45	642	78	364	609	6670
Far Northern	2234	1924	23	122	333	43	522	257	6546
Golden Gate	3225	3621	100	45	315	36	92	230	8729
Harbor	1671	1618	215	134	158	25	237	645	4969
Inland	2030	1934	357	27	342	7	202	249	5550
Kern	1635	2225	91	79	421	34	444	687	7078
Lanterman	2633	2049	381	81	506	93	292	417	7518
North Bay	3505	2864	615	70	235	108	154	545	9393
North Los Angeles	1664	2006	55	42	527	148	247	507	6269
Orange	2201	2315	218	16	478	71	106	210	6818
Redwood Coast	1951	1652	99	51	585	66	653	687	7439
San Andreas	2755	2566	485	21	709	185	202	260	8733
San Diego	2005	2124	61	42	576	47	138	157	5960
San Gab/Pomona	2836	2299	202	62	316	62	151	323	6912
South Central LA	2704	2327	681	31	161	22	118	153	7308
Tri-Counties	2140	2921	17	114	325	42	254	380	7468
Valley Mountain	2680	2342	187	45	463	58	209	464	7066
Westside	2211	2210	665	33	496	221	224	642	7994
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are mean per client service costs. Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.E.3**

Year 1999-2000, 1% Trimmed Cost Values, Average Per Client Service Expenditures by Regional Center: (b) Other Independent Variables Controlled

Regional Center	Service Category								POS Total
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	
Alta	3124	3016	222	31	106	61	314	268	8741
Central Valley	3164	2967	0	92	309	-12	252	294	8126
East Bay	3232	3155	-30	11	42	53	282	182	8595
East Los Angeles	3361	2882	441	39	275	54	484	725	10228
Far Northern	3096	2641	-16	128	87	8	564	152	8081
Golden Gate	3496	3939	-7	49	55	6	198	248	9612
Harbor	3252	2494	189	128	-188	-10	329	693	7866
Inland	2866	2457	305	26	20	-27	311	311	7340
Kern	3315	3022	56	83	132	3	544	725	10042
Lanterman	3381	2661	329	70	148	62	397	497	9379
North Bay	3261	3054	520	70	-41	72	223	488	9250
North Los Angeles	2984	2970	43	35	188	113	319	517	8854
Orange	2987	2770	146	13	156	41	205	253	8304
Redwood Coast	3343	2256	58	56	334	29	689	562	9526
San Andreas	3409	3118	425	16	348	144	302	295	10101
San Diego	2823	2583	-3	37	246	11	226	164	7354
San Gab/Pomona	3239	2484	121	63	51	42	264	379	7974
South Central LA	3415	2942	653	29	-194	-9	249	297	9273
Tri-Counties	3397	3590	-29	115	56	14	334	370	9688
Valley Mountain	3067	2948	120	47	192	27	315	496	8517
Westside	3587	2961	630	29	147	181	296	638	10274
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services.

**Table IV.E.4**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Gender

Gender	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Female	2181	2454	250	47	395	64	206	339	6813
Male	2377	2167	223	54	444	73	216	328	6855
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
Female	3139	2918	202	56	132	44	337	411	8838
Male	3318	2883	196	56	103	38	339	404	8983
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Service

**Table IV.E.5**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Ethnicity

Ethnicity	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Asian	1355	1695	214	39	492	77	150	227	4961
Black	2206	2205	304	28	329	83	185	292	6554
Filipino	1382	2042	206	52	529	106	160	276	5625
Hispanic	1202	1567	184	62	509	49	168	218	4524
Native American	2064	2223	161	52	315	37	216	219	5871
Other	1498	1605	173	50	634	117	220	290	5476
Polynesian	2014	1890	223	61	356	69	123	198	5601
Unknown	1054	1104	97	95	560	98	242	315	4369
White	3307	3005	275	46	356	69	247	428	8938
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
Asian	3265	2679	210	43	83	27	324	413	8640
Black	3163	3086	223	46	147	58	345	381	9109
Filipino	3269	2855	198	58	160	58	345	447	9163
Hispanic	3283	2941	174	58	102	9	329	385	8804
Native American	2719	2849	168	52	82	26	280	294	7777
Other	3342	2872	195	49	177	54	385	463	9208
Polynesian	3613	2750	202	64	28	32	295	351	8876
Unknown	3195	3027	214	74	99	46	360	447	9148
White	3206	3043	203	56	181	57	377	485	9472
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

Legitimate cost factor #1: Consumer age. We next will contrast the preceding results for the potential biasing factors with comparable results for the legitimate cost factors. The first of these legitimate cost factors is consumer age. The effects of consumer age are shown in Table IV.E.6, with results with other independent variables not controlled shown in the top half of the table and results with other independent variables controlled shown in the bottom half of the table. Here, we will use the following terms for age groups: 0-2 years = infants, 3-11 years = children, 12-22 years = adolescents, 23-44 years = young adults, and 45+ years = older adults. For the uncontrolled results, the largest difference between age groups was between the older adults and children, a difference of \$ 9,305 per year in service costs, corresponding to a Cohen's  $d$  of 1.26, a very large effect. After effects of other independent variables were controlled, as shown in the bottom half of the table, the largest contrast between age groups was between young adults and children, a difference of \$ 5,823, associated with a Cohen's  $d$  of 0.79, still a rather large effect. Thus, controlling for the other independent variables reduced substantially the differences between the different age groups, but very large differences still remained across groups even in the controlled analyses.

In addition to the simple estimation of the magnitude of the differences in overall expenditures, we must look at the pattern of expenditures across the specific cost categories. Inspection of Table IV.E.6 shows that almost all of the service expenditure differences between the child and adolescent groups and the young and older adult groups arose from differences among these groups in costs for day programs. During the child and adolescent years, consumers receive their services largely through non-DDS sources, through agencies associated with the school system. Once adolescents "age out" of the school system, they then require services for day programs through the regional centers. In addition, the older adult group requires a bit less in the way of day program services, because some of these older adults are reaching retirement ages. Thus, the trends shown for service costs as a function of age group are readily explained and expected.

Legitimate cost factor #2: Residence type. The effects of residence type are shown in Table IV.E.7; estimated means with other independent variables not controlled are shown in the top half of the table, and means with other independent variables controlled are shown in the bottom half of the table. In the top half of the table, the largest difference between groups was for residents in CCFs versus the home of a parent or guardian. This difference was \$ 19,375 per year, associated with a Cohen's  $d$  value of 2.63, a very large effect. After controlling for other factors, the largest difference was between residents in CCFs and those in SNFs, a difference of \$ 19,543, corresponding to a Cohen's  $d$  value of 2.65. Thus, the controlling of other independent variables had little effect on service costs associated with residence type. The estimated means as a function of residence type are also expected.

Legitimate cost factor #3: Consumer characteristic. The cost variations as a function of client characteristic are shown in Table IV.E.8; estimated means with other independent variables not controlled are shown in the top half of the table, and means with other independent variables controlled are shown in the bottom half of the table. Prior to controlling other independent variables, the largest difference between categories of clients was between Behavior Adjustment and Child Development, a difference of \$ 14,103, associated with a very large Cohen's  $d$  of 1.91. However, after controlling for other independent variables, the largest difference between categories of clients was between Behavior Adjustment and Habilitation, a difference of only \$ 2,958, associated with a Cohen's  $d$  of only 0.40. Thus, initial differences between the consumer characteristic groups were largely spurious; when appropriate controls were introduced, the differences between the groups were largely erased.

Legitimate cost factor #4: Consumer level of mental retardation. The cost variations as a function of client level of mental retardation are shown in Table IV.E.9; estimated means with other independent

variables not controlled are shown in the top half of the table, and means with other independent variables controlled are shown in the bottom half of the table. The results for the uncontrolled analyses show the largest difference to be between consumers with profound mental retardation and those with unspecified mental retardation, a difference of \$ 8,379, associated with a rather large Cohen's *d* of 1.14. However, when other independent variables are controlled, the largest difference is between consumers with severe mental retardation and those with no retardation, a difference of \$ 1,686, associated with a fairly small Cohen's *d* of 0.23.

In terms of the Total POS, consumers with severe and profound mental retardation appear to require more services than do persons in the other categories of mental retardation. These differences in Total POS seem to arise from differences only in the Out of Home and Day Program categories of costs, as costs in the other categories appear to be fairly similar across the categories of persons with mental retardation.

**Table IV.E.6**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Age Group

Age Group	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
00-02 Years	265	1863	135	197	732	37	757	60	7735
03-11 Years	186	146	19	103	809	105	235	195	2435
12-22 Years	1385	404	53	44	577	115	189	193	4029
23-44 Years	3426	4394	451	27	169	28	217	504	10247
45+ Years	5090	4493	431	27	70	26	190	416	11740
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
00-02 Years	3419	3086	122	128	23	-1	747	242	11127
03-11 Years	2885	872	-7	68	239	61	262	311	5442
12-22 Years	3418	1220	41	30	211	89	231	374	7013
23-44 Years	3564	4950	441	27	47	23	233	599	11265
45+ Years	2856	4374	396	25	68	34	216	511	9707
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

**Table IV.E.7**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Residence

Residence	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
CCF	14761	5472	592	33	16	23	118	335	22521
Home of Parent	93	1125	148	61	630	94	188	206	3146
ICF	528	7907	526	30	19	12	140	329	10542
Independent Living	230	2795	171	30	29	22	545	1130	6952
Other	1348	1580	108	36	72	29	357	831	6160
SNF	599	2216	120	45	11	15	91	219	3856
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
CCF	14936	4172	429	69	66	25	240	226	21827
Home of Parent	458	2140	222	70	606	93	295	209	5341
ICF	372	5931	373	33	-198	13	226	188	7930
Independent Living	938	2542	90	72	365	69	666	1037	8831
Other	1548	1894	113	49	68	25	452	730	7250
SNF	1118	723	-35	40	-200	21	148	54	2284
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

**Table IV.E.8**

Year 1999-2000, 1% Trimmed Costs – Average Per Client Service Expenditures by Client Characteristic

Client Characteristic	Service Category								
	Out of home	Day pgm	Trans-port	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
Autism	2099	1405	157	86	772	140	337	501	6913
Behavior Adjustment	7062	4565	362	41	529	108	216	562	15978
Child Development	188	129	16	81	686	95	168	127	1875
Habilitation	2530	2411	287	22	125	36	205	410	6690
Medical	2083	3053	266	64	518	47	265	342	8347
Physical Development	857	2204	164	110	856	69	261	292	6486
Physical-Social Develop	3370	4527	397	66	569	95	202	245	10980
Sensory	3893	4089	360	40	341	53	224	389	10742
Social Development	4466	4588	435	32	348	73	159	254	11359
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
Autism	3427	2914	209	73	173	58	424	585	9731
Behavior Adjustment	4292	3033	188	56	18	38	305	440	10300
Child Development	3103	2687	196	48	23	23	257	367	7976
Habilitation	2742	2363	196	70	52	35	345	366	7342
Medical	3086	2629	147	45	148	27	361	393	8705
Physical Development	3174	3060	204	24	220	38	290	407	9209
Physical-Social Develop	3072	2994	210	62	187	64	349	348	8936
Sensory	3239	3092	207	63	118	33	365	415	9188
Social Development	2920	3329	231	61	121	53	346	346	8810
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

**Table IV.E.9**

Year 1999-2000, 1% Trimmed Cost Values – Average Per Client Service Expenditures by Level of Mental Retardation

Level of Mental Retardation	Service Category								
	Out of home	Day pgm	Transport	Med care	In hm resp	Out hm resp	Other	Supp svcs	POS Total
Other Independent Variables Not Controlled									
No retardation	781	936	86	77	553	88	302	401	4323
Mild	1869	1664	188	41	288	51	216	374	5416
Moderate	3266	2878	341	37	406	72	160	274	8261
Severe	4602	4617	437	53	519	68	164	246	12006
Profound	3921	5834	444	60	418	32	159	312	12497
Unspecified	791	593	61	84	860	168	229	209	4118
Mean	2295	2287	234	51	424	69	212	332	6838
Residual SD	3883	3459	599	215	888	437	650	1635	7371
Other Independent Variables Controlled									
No retardation	2957	2376	169	70	85	30	377	420	8181
Mild	3056	2462	171	61	60	29	355	435	8251
Moderate	3137	2720	223	56	138	44	349	443	8815
Severe	3456	3527	250	52	165	37	324	372	9867
Profound	3621	3868	216	36	68	22	266	327	9694
Unspecified	3144	2448	162	60	191	84	357	449	8657
Mean	3228	2900	199	56	118	41	338	407	8911
Residual SD	3883	3459	599	215	888	437	650	1635	7371

*Note:* Tabled values are adjusted mean per client service costs (i.e., least squares means). Service categories are: Out of home = all out of home expenses, Day pgm = day programs, Transport = transportation, Med care = medical care, In hm resp = in-home respite, Out hm resp = out-of-home respite, Other = other non-medical, Supp svcs = support services, POS Total = total Purchase of Services

## **V. FINDINGS AND RECOMMENDATIONS**

This report demonstrated clear and interpretable patterns of service expenditures for clients served through the 21 regional centers around the State of California. Importantly, the patterns of service expenditures were very similar across the five fiscal years examined, suggesting that the regional centers maintain consistent standards for service delivery. With regard to the broad picture, the findings support the contention that consumer-related factors drive much service funding. These consumer-related characteristics were chronological age, residence type, consumer characteristic, level of mental retardation, and levels of adaptive and maladaptive behavior.

The potential biasing factors of gender and ethnicity were found to have negligible effects. Importantly, results from the first Purchase of Services study (April 1999) that purportedly documented large ethnic group differences in service costs were shown, in the current study, to be the result of problematic analyses. That is, when important and reasonable factors that should influence consumer service costs are controlled, the remaining differences in service costs across ethnic groups were very small and essentially negligible.

But, there were clear indications of variations across regional centers that were not accounted for by the consumer characteristics employed in the current statistical modeling. Some of the differences across regional centers in their average consumer service costs may well be due to legitimate cost-related variables (e.g., client medical conditions, availability of services in the catchment area) that were unavailable in the current study. Future research should be undertaken to account for these differences.

The present report is the first of three to be delivered under a contract titled "Purchase of Services Study II." The present study has documented clearly the influences of legitimate cost factors such as client chronological age, residence type, consumer characteristic, level of mental retardation, and levels of adaptive and maladaptive behavior. These factors should drive services and they do. In particular, consumer age and residence have large, consistent, and expected effects on the major cost categories. The variables of consumer characteristic, level of mental retardation, and levels of adaptive and maladaptive behavior had smaller, but still quite consistent and expected effects on service costs. The potentially biasing factors of consumer gender and ethnicity were shown to have rather small influences on service costs.

The only remaining, and partially enigmatic results have to do with the differences across regional centers in their levels of consumer service costs. Regional centers showed clear differences in mean expenditures across categories, even after controlling for other independent variables. The remaining two reports to be delivered under this contract will strive to understand the bases for differences across regional centers in their average expenditures, using survey and focus group data to illuminate the service delivery process. At present, our strongest recommendation is to await the outcomes of the next two reports, which will fill out the picture with regard to service delivery and state clear recommendations for future research and for an informed understanding for the factors that influence the ways in which the DDS system delivers services to persons with developmental disabilities.

## **VI. APPENDICES**

Appendix A: Service Codes Subsumed Under the Nine Cost Categories Analyzed

Appendix B: Tables for Fiscal Year 1995-1996

Appendix C: Tables for Fiscal Year 1996-1997

Appendix D: Tables for Fiscal Year 1997-1998

Appendix E: Tables for Fiscal Year 1998-1999

Appendix F: Tables for Fiscal Year 1999-2000